SCIENTIFIC AMERICAN

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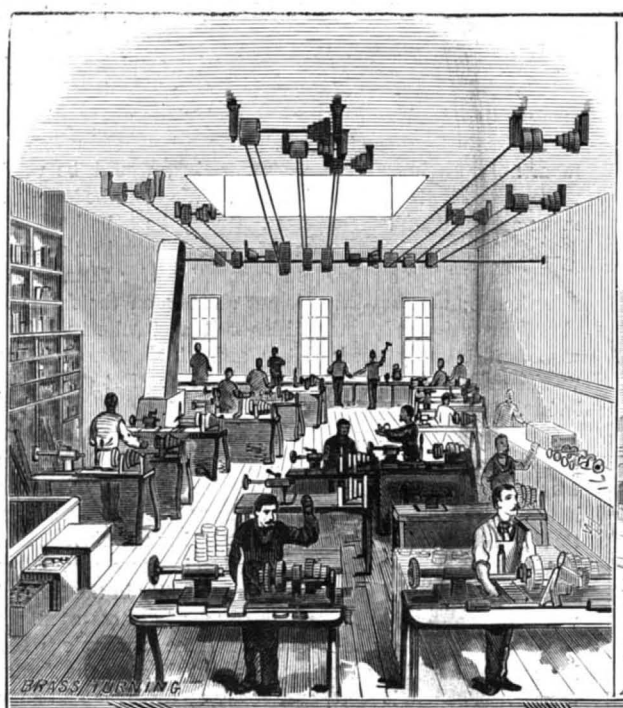
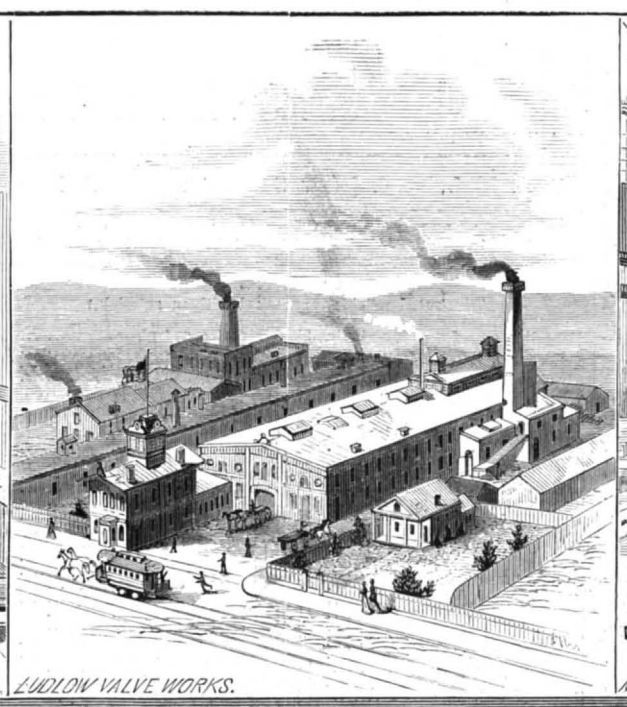
THE MANUFACTURE OF VALVES.

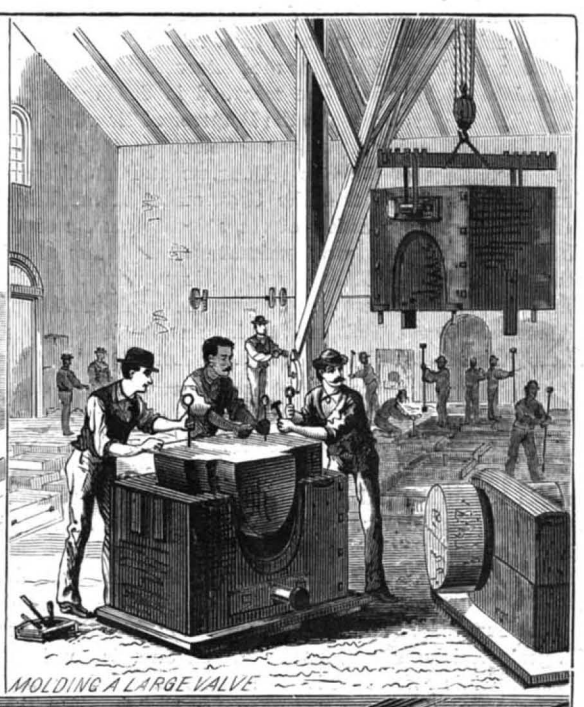
The introduction of water and gas into all cities and towns of any note throughout the country, and the constantly increasing use of steam, both as a motor and for heating purposes, have given rise to several distinct branches of industry in the manufacture of the required apparatus and appliances. The most extensive establishment in the United States devoted exclusively to the manufacture of brass and iron valves of all descriptions, and the latest improved style of fire hydrants, is that of the Ludlow Valve Manufacturing Company, of Troy, N. Y., which is illustrated in our engraving. This business originated eighteen years ago, at Waterford, near Troy, and met with such speedy success that the present company was soon after organized with ample capital for the prosecution of the enterprise upon an enlarged scale. When this company commenced the manufacture of valves there were no straightway valves in the market except those having a solid gate in one piece; and the introduction of the double valves, for which they have several patents, also their single adjustable gate valve, was a very important innovation. The double iron gates, from 1½ inch upward, and the single ones, from 10 inches upward, move closely between parallel faces, rendering them self-clearing from any foreign matter that may become attached to them. Gas and water companies find this a feature of decided importance. The double water valves possess a marked advantage over other forms of gate valve, from the peculiarity of their construction, the gate being kept in line by the parallel seats.

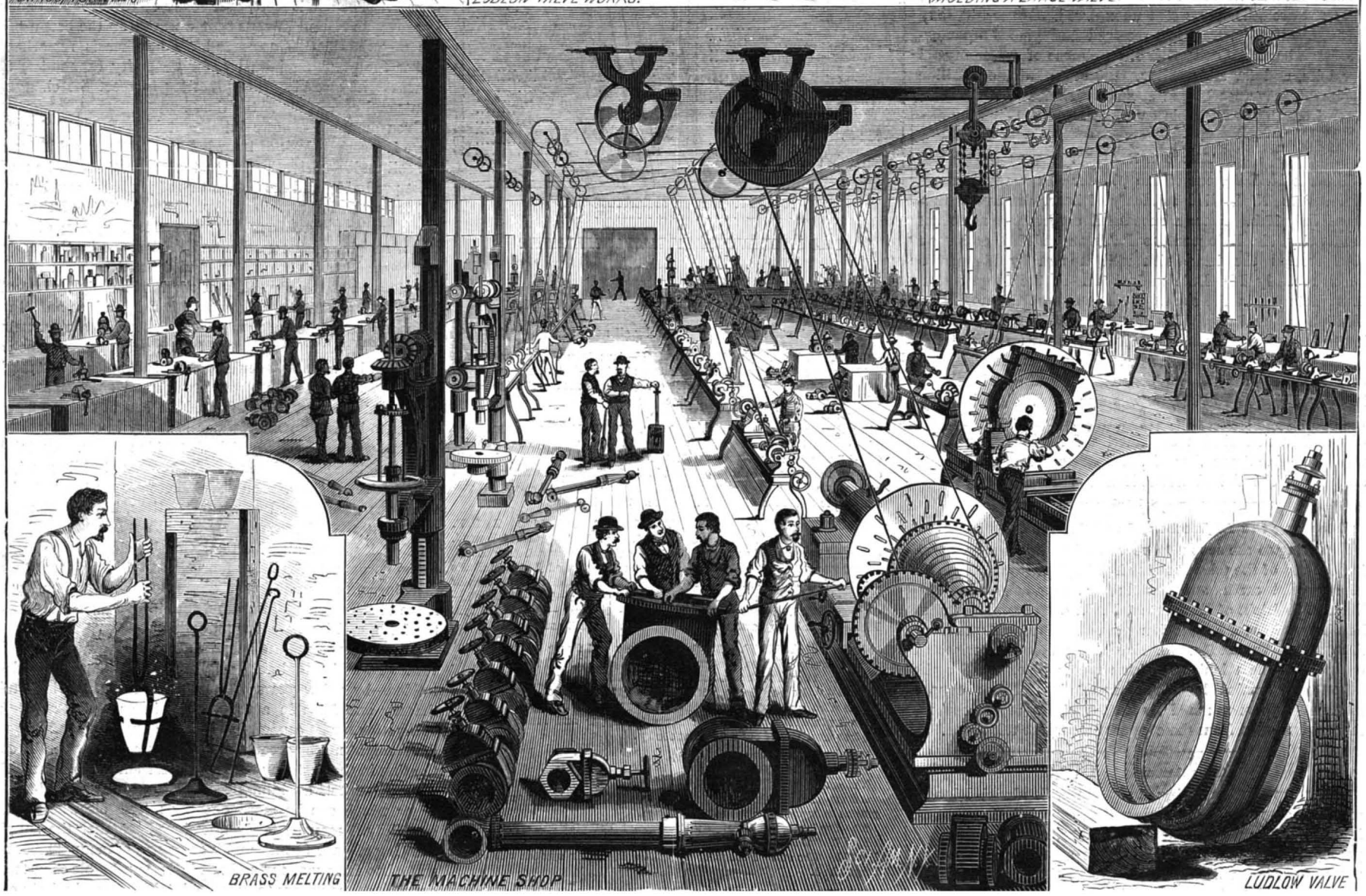
The factory premises comprise an area of 270x325 feet, with substantial brick machine shop, iron foundry, brass foundry, pattern shop, store houses, offices, etc. Brass valves are made from ½ to 8 inches inclusive, and larger if required, all having double gates. These valves are made of the best steam metal and well finished. The iron valves range from 1½ to 48 inches inclusive. They are made either with double or single gates, all iron or mounted with steam-metal, screwed socket, flange, hub, spigot, or any two on the same valve, also with screwed stems, or with a quick moving slide stem and lever. This last has a patented arrangement by which the gate is fastened instantly at any desired position.

Before leaving the works, every valve is carefully tested under heavy pressure to ascertain if it is perfectly tight and in good working order. The company manufacture for


BRASS TURNING.


LUDLOW VALVE WORKS.


MOLDING A LARGE VALVE


THE MACHINE SHOP

BRASS MELTING

LUDLOW VALVE

FACTORY OF THE LUDLOW VALVE MANUFACTURING CO.

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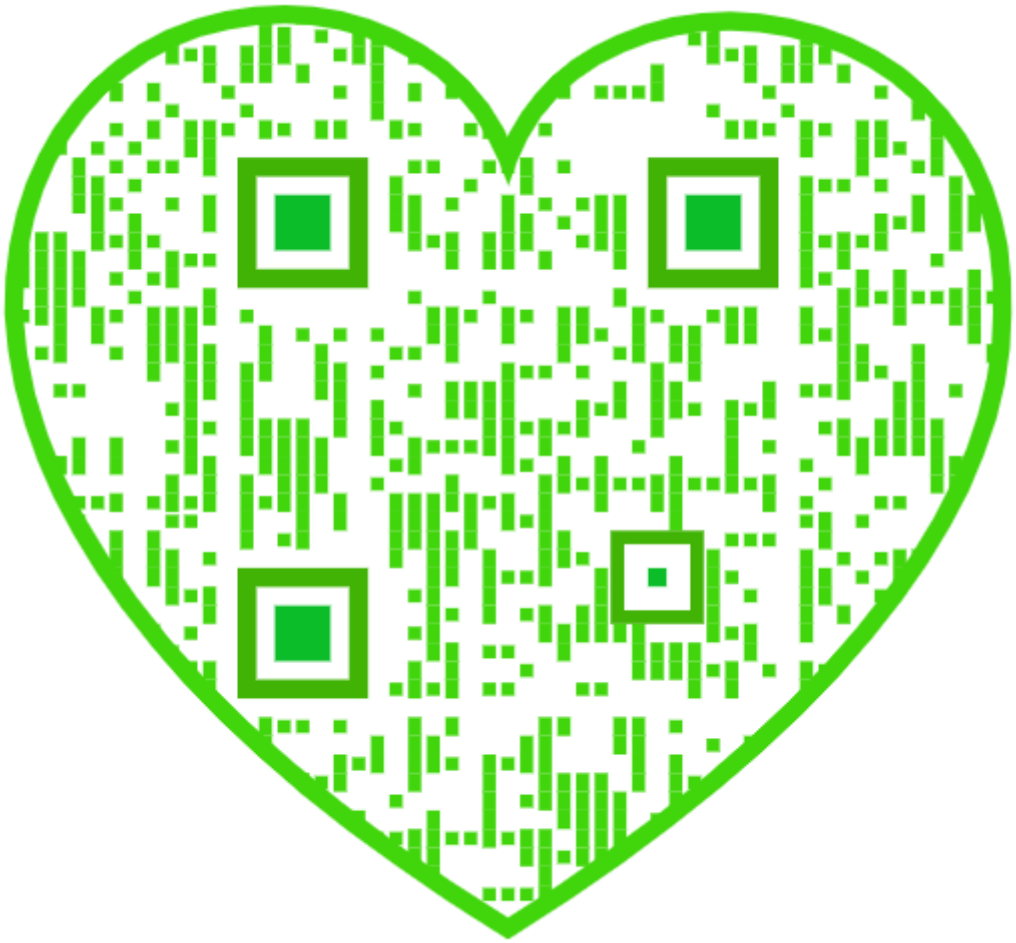

attachment to the larger valves, when desired, indicators of different kinds for showing the exact position of the gate. We understand they also make to order any special size or pattern of brass or iron valves with extra finish. The company's goods are largely used by water and gas companies and steam fitters in all parts of the United States and Canada, and also to a considerable and increasing extent abroad, and these goods are everywhere regarded as the standard. Making the production of valves and hydrants a specialty, the company have brought their manufacture to such perfection that they can successfully compete with any similar concern in the country. As an evidence of the high appreciation in which the goods of this company are held we may say that even during the four years of great business depression throughout the country, each year has shown marked success in their business. The officers of the company are as follows: H. G. Ludlow, president; D. J. Johnston, vice president; M. D. Schoonmaker, treasurer. Possessing large means, long practical experience, excellent manufacturing facilities, and having great energy and enterprise, the Ludlow Valve Manufacturing Company cannot fail to retain the leading position which they have so worthily won.

The Darien Canal.

AT a recent meeting in Bordeaux, M. De Lesseps said that American support had been secured for the Darien Canal project. Nine of the principal financial establishments in Paris had promised their aid for a small commission.

Dr. Campany, the military physician, who was engaged in the sanitary arrangements during the construction of the Suez Canal, is about to be sent to Panama to ascertain what measures will be necessary for the preservation of the health of the laborers, who are to be recruited in South America. M. De Lesseps has written to the Emperor of Brazil asking for laborers. In his report to the Secretary of State upon the proceedings of the Canal Congress at Paris, Admiral Ammer recommends that the Government of the United States form a commission of the ablest engineers of the Army, and invite the most eminent civil engineers of this country and of those European countries represented in the Paris Congress to meet and discuss the whole matter, unembarrassed by the rival personal interests which attached to the grants secured by the French engineers.

Geological Specimens from Luray Cave.

Our readers will remember a series of letters published in these columns not long ago describing a recently discovered cave in a beautiful valley in Virginia, about 80 miles southwest from Washington. Our correspondent was sent specially to investigate the wonders of Luray Cave, and he gave our readers an interesting account of his adventures and discoveries.

This Luray Cave undoubtedly possesses the most wonderful geological formations yet discovered on this continent. The accessible portions of it extend some three or four miles, and there are other parts still unexplored. Messrs. Tiffany & Co., of this city, have just received and placed upon exhibition a beautiful collection of specimens of water crystal of calcite, nodular stalagmites, calcareous tufa, crystalline pavement, cave pearls, and several varieties of stalactites, taken from this remarkable cave.

Thomas N. Dale.

Thomas N. Dale, one of the pioneer silk manufacturers of Paterson, N. J., died suddenly of heart disease, at that place, July 17th. After a successful career as a merchant in this city, Mr. Dale went to Paterson, in 1862, and soon after erected the large silk mill known by his name. Until recently Mr. Dale ranked among the largest silk manufacturers in the country. He was specially noted for his high personal worth, his great interest in matters relating to industrial art, and his active efforts for the promotion of the welfare of silk operatives. He was one of the State commissioners for the establishment of industrial schools in New Jersey. In 1876, he was appointed United States Centennial Commissioner. He has been first vice-president of the Silk Association of America for many years. He was a prominent member of the Paterson Board of Trade, and also of the United States Board of Trade.

Hearing the Lightning through the Telephone.

Referring to the accounts we recently published concerning the use of the telephone for hearing the electrical action of supposed earth currents during thunderstorms, Mr. Wm. S. Aldrich, of Burlington, N. J., calls our attention to his observations, of similar character, published in SCIENTIFIC AMERICAN, August 3, 1878. He states that he connected one pole of the telephone with the gas pipe, and for the other earth terminal he placed a small piece of sheet copper in moist earth surrounded by broken pieces of gas carbon. A wire extended from the copper plate to the telephone.

The Ammonia Bath.

A correspondent residing at Honolulu, Sandwich Islands, says that a good health preservative, especially in summer, is to sponge the body with cold water, containing a small percentage of some alkali, such as ammonia. The ammonia combines with the oil or grease thrown out by the perspiration, forming a soap, which is easily removed from the skin, leaving the pores open, thus promoting health and comfort.

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NEW YORK, SATURDAY, AUGUST 9, 1879.

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Blasting by Means of Compressed Air. By W. E. GARFORTH.

The American River Paddlewheel Steamboat "Mary Powell." By Chief Engineer ISHERWOOD, U.S.N. A description in detail of the hull, engine, boilers, and paddlewheels of this fast steamer, with a record of performance during one season.

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WHAT TO DO NEXT WINTER.

A "country clergyman" sends a timely and suggestive communication, from which we quote the following:

"Among your forty thousand subscribers, all of whom it is presumed are specially ingenious persons, there must be very many who are disposed to exercise their talent, philanthropically, and without hope of reward. I am desirous to learn in what way to utilize an immense amount of unemployed power, which might be made a source in the aggregate of immense wealth. It is, however, human power that I mean. We have just passed through our winter season, and there is now a call for all the labor that the market affords. But during several months of the winter usually many farmers, or more especially laboring men, hired men, young men, and boys that work for a living, are very much at a loss what to do with idle time. Will you, or some of your correspondents, publish a few lines on this most important subject? What indoor work can be done by people of very little education, in order to keep the pot a-boiling, to help pay the rent, and otherwise make both ends meet? Of course the work must be something that is not usually done in large factories or by machines. One would think there must be a great variety of articles required by the public that shall come under this class of work. Even there might be some kind of work that should be done partially in a factory, the rest of which should be done by hand in the homes of the people. A proper answer to this question, as I suppose it might be answered, would make farming more profitable, tend to keep young men on the farm, save many unwilling idlers from congregating at the store or saloon, and give, what of all things they desire, to many idlers profitable work."

No doubt a great variety of productive employments suitable for different parts of the country can be pointed out by our practical readers, employments which do not require any particular manual dexterity, which can be taken up at odd moments and, however unremunerative, would be vastly more profitable than sheer idleness. We shall be happy to make a note of any suggestions that may be submitted.

Meantime it may not be out of place to consider whether there is really any need of new occupations for farmers and farm hands; whether there is not already on the farms an abundance of purely manual as well as intellectual farm work which sadly needs doing, and which, were it done, would greatly increase the profit and comfort of country living.

Our correspondent writes from a historic town in Massachusetts, and has in mind the wants of New England farmers and farm hands. Time was when the average New England farmer was a man of more than average intelligence and thrift. Now it may be questioned whether the average New England mechanic is not his superior in these particulars. And the difference is shown not so markedly in the farmer's winter idleness as in his unthrifty laboriousness at all seasons. The characteristics of the Yankee mechanic, which have made him king of artisans, are not those of the Yankee farmer. The one is alert, ever ready to discover and adopt improvements, and always bent on making the best use of the materials at his command. The other is remarkable rather for plodding industry, for unthrifty economies, for slowness in changing his practices to meet the changing wants and conditions of the times.

Even among the more intelligent New England farmers there is a serious lack of knowledge as to the capabilities of the soil under cultivation, as to the crops that can be made most profitable, and the best means of producing such crops, not to speak of the preservation of the fertility of the soil; of means for preventing the ravages of insect pests; of methods of supplementing garden and field crops by the rearing of fine grades of fowls, sheep, and other live stock; of augmenting the bulk and variety of the food supply by restocking useless ponds and streams with fish, and so on. In a thousand ways the farmers of New England are pursuing unthrifty methods, by which they lose every year as much as they win, by which they miss possible advantages that might increase enormously both their wealth and enjoyment.

No doubt it would be an immediate benefit to many a poor farmer to be told how by indoor industry in rough weather he could add a hundred dollars to his income. Certainly that would be better than to spend the time in idle gossip at the cross-roads store. But the chances are ten to one against the farmer, who could so waste his time, having a farm so well kept that the same labor would not be worth twice as much if it were applied directly to the clearing up of neglected corners, to repairing fences, out-buildings, tools, and machinery, to say nothing of efforts to gain a higher knowledge of the science of farming, to improve the condition of the farm, and increase its productive capacity.

It is safe to say there is not a farm in New England the value of which could not be advanced—perhaps doubled or trebled—by a few years of intelligent effort. It is certain that not one farm in a thousand is in so perfect a state of cultivation, or its capacity so widely developed, that its products might not be greatly increased in a single year by cultivating in the best way the crops best suited to it and the nearest market, avoiding products for which it is ill-adapted or which can be more cheaply raised elsewhere. Accordingly it may be fairly questioned whether the supplementing of poor farming with some sort of manual labor not related to farm work would not be less profitable than to encourage poor farmers to become intelligent and wisely economical farmers. Trying to compete with skilled labor and machinery by hand work cannot be other than discouraging,

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even to save otherwise idle time; to do it when the time can be put to better use, more especially when the main business of life demands all of one's time and thought, is certainly not the height of wisdom. Shiftless farming, even when allied to winter thrift, can never accomplish as much as skillful farming fostered by winter study and perennial intelligence and thoughtfulness. New England needs good farmers, rather than any hybrid class of unskilled farmer-mechanics.

And what is true of farm owners is equally true of farm workers. There is no way in which young farm hands can employ their spare time so profitably as in studying to become intelligent farmers. And the best work that can be done for the young people of our rural districts lies, it seems to us, in the direction of encouraging among them, especially in winter, studies calculated to make their summer work more intelligent and more profitable to themselves and to the community as a whole.

PROBABLE OPPORTUNITIES FOR NEW DISCOVERIES IN ACOUSTICS.

The heretofore received theory of hearing by the telephone was that the thin diaphragm of metal, like that of the phonograph, served as a sort of artificial ear drum, which was vibrated to and fro by the electrically produced magnetic attractions and r epulsions of the iron core. The most recent experiments, by observers such as M. Du Moncel, M. Ader, and H. Wildbrand, show that this explanation is incorrect, because the magnetic intensity of the telephone is found to be altogether too feeble to move or overcome the inertia of the metallic diaphragm.

The corrected theory now is, that the sounds heard in the telephone are due to a movement of the molecules composing the iron core of the telephone, induced by the electrical current. These molecular movements are conveniently transmitted to the ear by the iron diaphragm; but paper or glass may be substituted for the iron; indeed, the diaphragm may be altogether removed, and the sounds will then be transmitted to the ear through the wooden case or handle of the telephone.

M. Du Moncel has made a telephone receiver, consisting merely of a piece of board having a magnetized watch spring fastened thereto by one end, and a fine helix secured to the board under the free end of the spring.

In this device only molecular vibrations can take place; but when the board is applied to the ear speech can be heard more clearly than with an ordinary telephone, or even the speaking microphone.

The results of these new experiments and observations seem to indicate that molecular vibrations must hereafter be taken into account in things relating to acoustics, and that a broad field for new discoveries in connection therewith is now opened to the student.

THE NEW BUREAU OF NATIONAL SURVEY.

The organization of the new system of national survey, under the directorship of Clarence King, has been completed, and the scope of the coming summer's work has been announced. The great central mineral belt, extending through Colorado, Utah, Nevada, and California, will be studied first, the main purpose in view being to find out what minerals there are, and where they are.

Mr. King says that in view of the practical questions which affect so many millions of national wealth, little attention comparatively will be bestowed on purely scientific questions. In other words, as he expresses it, "We will allow the fossils to rest quietly in their beds and permit the rocks to 'dip' as they please, until we have settled some of the more important questions relating to economic geology." The precious metals alone, however, are not to engross attention. The plans include a thorough investigation of the coal, iron, and lead deposits of the United States, which will be conducted concurrently with that of the gold and silver deposits.

The field-work of the present summer will be occupied with "The Metallic Wealth of Colorado," centering at Leadville; "Lead Silvers of Nevada," centering at Eureka; "The Great Comstock Lode;" "The Central Gold Field of California."

The Leadville division will be under the charge of Mr. S. F. Emmons, geologist, and Mr. A. D. Wilson, topographer. In charge of the Eureka division will be Professor Becker, geologist, and Mr. F. A. Clark, topographer. Mr. King himself will supervise the work at the Great Comstock and in California.

Professor Raphael Pumpelly, so well known by his scientific researches in this country and in Asia, will, it is hoped, take charge of the investigation of the coal and iron deposits. Mr. Arnold Hague, late Imperial Expert of China, Mr. C. K. Gilbert, late of the Powell Survey, and Dr. F. V. Hayden, will be engaged in the work.

Major Powell's connection with the survey and with the Land Commission will not interfere with the work of ethnographical and ethnological research in which he has been so long engaged. The field work in this direction during the present summer will be devoted to completing the investigation of the architecture, the manufactures, and the family and tribal characteristics of the Pueblo or Village Indians of New Mexico and Arizona.

The very important work of classifying the public lands will be advanced as rapidly as possible. Notwithstanding the enormous industrial and financial interests which center, at present and prospectively, in our Western mineral lands, and the national importance of the scientific exploration of them, the new Bureau enters upon its work sorely hampered by the meagerness of the appropriation made for its support.

HOW TO PRESERVE CIDER.

A pure, sweet cider is only obtainable from clean, sound fruit, and the fruit should therefore be carefully examined and wiped before grinding.

In the press, use hair cloth or gunny in place of straw. As the cider runs from the press let it pass through a hair sieve into a large open vessel that will hold as much juice as can be expressed in one day. In one day, or sometimes less, the pomace will rise to the top, and in a short time grow very thick. When little white bubbles break through it, draw off the liquid through a very small spigot placed about three inches from the bottom, so that the lees may be left behind. The cider must be drawn off into very clean, sweet casks, preferably fresh liquor casks, and closely watched. The moment the white bubbles, before mentioned, are perceived rising at the bunghole, rack it again. It is usually necessary to repeat this three times. Then fill up the cask with cider in every respect like that originally contained in it, add a tumbler of warm sweet oil, and bung up tight. For very fine cider it is customary to add at this stage of the process about half a pound of glucose (starch sugar), or a smaller portion of white sugar. The cask should then be allowed to remain in a cool place until the cider has acquired the desired flavor. In the meantime clean barrels for its reception should be prepared, as follows: Some clean strips of rags are dipped in melted sulphur, lighted and burned in the bunghole, and the bung laid loosely on the end of the rag so as to retain the sulphur vapor within the barrel. Then tie up half a pound of mustard seed in a coarse muslin bag, and put it in the barrel, fill the barrel with cider, add about a quarter of a pound of isinglass or fine gelatine dissolved in hot water.

This is the old fashioned way, and will keep cider in the same condition as when it went into the barrel, if kept in a cool place, for a year.

Professional cider makers are now using calcium sulphite (sulphite of lime), instead of mustard and sulphur vapor. It is much more convenient and effectual. To use it, it is simply requisite to add one-eighth to one-quarter of an ounce of the sulphite to each gallon of cider in the cask, first mixing the powder in about a quart of the cider, then pouring it back into the cask and giving the latter a thorough shaking or rolling. After standing bunged several days to allow the sulphite to exert its full action it may be bottled off.

The sulphite of lime (which should not be mistaken for the sulphate of lime) is a commercial article, costing about 40 cents a pound by the barrel. It will preserve the sweetness of the cider perfectly, but unless care is taken not to add too much of it, it will impart a slight sulphurous taste to the cider. The bottles and corks used should be perfectly clean, and the corks wired down.

A little cinnamon, wintergreen, or sassafras, etc., is often added to sweet cider in the bottle, together with a drachm or so of bicarbonate of soda at the moment of driving the stopper. This helps to neutralize free acids, and renders the liquid effervescent when unstoppered; but if used in excess it may prejudicially affect the taste.

CHANGES IN PHOTOGRAPHY.

The substitution of dry sensitive plates for the common wet plates has made great progress during the past year or so; the old cumbersome method of dipping a collodion covered glass plate into water containing nitrate of silver, then taking the picture before the plate has time to get dry, is becoming obsolete both for indoor and outdoor work.

Dry plates, having a sensitiveness equal to or exceeding of wet plates, are now easily prepared, and their convenience and economy have been fully demonstrated. The traveling photographer no longer needs to load himself down with water bottles, liquids, and bath apparatus. He simply provides a few slips of prepared dry glass, with which and a light camera he climbs to the difficult places and secures the views he wants. The gallery artist is no longer obliged to waste his business time in waiting for the preparation and development of wet plates after his customers have come; but he may now both prepare and develop the dry plates out of business hours, and thus attend to two or three times as many sitters as heretofore. These dry plates may be kept on hand ready for use for an indefinite period.

At the present time gelatine is the base used as the skin with which to cover these plates. The gelatine is dissolved in warm water, bromide of ammonium is added, and the mixture is digested with heat. A solution of nitrate of silver is then added, and the mass is thoroughly mixed and cooked, being kept at a uniform moderate temperature for four or five days continuously. The mixture is then poured on the surface of the glass plates, dried in the dark, and the plates are ready for use. Such plates require an exposure of only two to three seconds in the camera in order to take the picture. If greater sensitiveness is wanted, then the gelatine-silver mixture must be kept under heat for seven or eight days instead of four or five. This is a very curious fact. Why the sensitiveness is increased by prolonging the time of cooking has not yet been ascertained. The development of the picture is effected by the use of a solution of pyrogallic acid followed by a solution of ammonia and bromide of potassium. The results produced are said to be in all respects excellent.

SPIRIT PHOTOGRAPHS.

For some time a certain class of newspapers have abounded in marvelous tales of spirit photography, the work of a lady photographer of Rochester, N. Y., assisted of course by the ghosts of her clients' ancestors and departed friends.

Recently two lady sitters were impressed by the old fashioned yet familiar costume and aspect of the spirits attending them in their pictures; and set to work to trace their probable pre-spirit history in the pages of an old magazine for ladies. The search was successful, the original of one of the spirits proving to be an engraving entitled "Nourmahal" and the other "The Last Rose of Summer." No doubt the spirits can give good reasons for masquerading in those particular costumes, but as yet they have failed to do so.

The photographs and engravings fell into the hands of a representative of the Rochester *Union*, who, in order to ascertain the process by which the ghostly picture was printed beside the sharply defined portrait, submitted them to a photographer who does not deal in spirits. The process was practically illustrated and explained as follows: A negative is first taken of the engraving. When the sitter comes for a picture the negative is turned the other side, the collodion put on and the glass put in the camera. In this manner the portrait of the sitter is on one side of the glass and what is intended for the spirit on the other. When the negative comes to be printed the paper is placed against the side of the glass having the portrait of the sitter and exposed to the light. The spirit being on the other side of the glass has to strike through it, which gives it the hazy appearance, while the portrait, being on the side next the light, comes out clearly defined. Any one who is desirous of doing so can test this for himself, and the illustration shown by the photographer explained the matter fully to the eyes of the inquiring newspaper man. The more artistic a photographer is, of course, the more unearthly he can make the work, and the gentleman in question said he could produce a picture of the most ghastly description.

THE ELECTRICAL ALARM COMPASS.

A short time since Mr. Henry A. Severn, of Herne Hill, England, brought out an ingenious compass alarm for use on shipboard. Its purpose is to make the compass signal automatically any considerable deviation of the ship from a desired course. Over the compass card are placed two index hands which can be adjusted to any angle; and these hands are so connected with an electric alarm that the moment the compass needle passes the limit of variation prescribed an alarm bell will ring in the captain's office, and continue ringing until the ship's proper course is restored. In this way any departure from the ship's course, as ordered by the officer in command, whether due to the steersman's inattention to duty or to a misunderstanding of the orders given, will be instantly made known. Of course when the officer gives his orders to the steersman he sets the index hands to correspond, and after that he is relieved of the necessity of constant observation of the compass to be sure that his order is strictly carried out.

This invention is just now receiving much attention in the scientific and other journals in England; and it is currently described as novel as well as likely to be useful. Its novelty, however, is open to question. In principle, and apparently in mechanical construction, it is substantially identical with the electro-magnetic attachment to ship's compasses patented in this country by Alfred Foucaut, July 19, 1870.

The essential part of the claim for this patent was the construction and arrangement of a compass, so that, by reason of any material variation in the route of the vessel, the needle of the same would close an electrical or magnetic circuit and sound an alarm.

The apparatus used in demonstrating the practicability of this system was made in this city by Mr. William F. Holske, model maker, now at No. 33 Park Row. Why the invention has remained so long undeveloped is not known.

New Bridge Over the Missouri near Omaha.

The Burlington and Missouri Railroad Company in Nebraska are about to build a new bridge across the Missouri River at Plattsmouth, about one mile below the mouth of the Platte River and 22 miles below Omaha.

The entire bridge will be about 3,000 feet in length, about 1,000 feet being over the present bed of the Missouri River. The bridge is in the charge of Mr. George S. Morrison, chief engineer, who will personally attend to its construction. The contract for the beton and concrete work has been given to the New York Stone Contracting Company, and will be done under the supervision of Mr. John C. Goodridge, Jr., president of the company. The other contracts are not yet made. The foundation in the river bed will be 55 feet below low water mark; the bottom of the bridge 55 feet above high water mark. It will take about a year to complete the structure. The Union Pacific bridge at Omaha cost over $2,000,000. The bridge at Plattsmouth is expected, from superior engineering, to cost much less. The Missouri River in the vicinity of Omaha is noted for its shifty character and treacherous quicksands. The river is now a mile further away from Omaha than it was last year, and has formed a new channel or cut off through the Oxbows, making the river about six miles shorter in length.

MR. ALVA CLARK, the famous telescope maker of Cambridge, Mass., was for forty years a portrait painter. He is now, in the 76th year of his age, hale, hearty, and energetic in his business.

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IMPROVED PRESSING MACHINE.

Mr. J. W. Jones, of Harrisburg, Pa., has invented a machine which will probably work a revolution in the dry-pressing of printed sheets. It is in practical use in the Government Printing Office at Washington, and in the State Printing Office at Harrisburg, and also at the bindery of Mr. John Mills, 14 Vesey street, New York. This machine will press printed and folded sheets, without set-off, and without fuller or glazed boards being interposed between them.

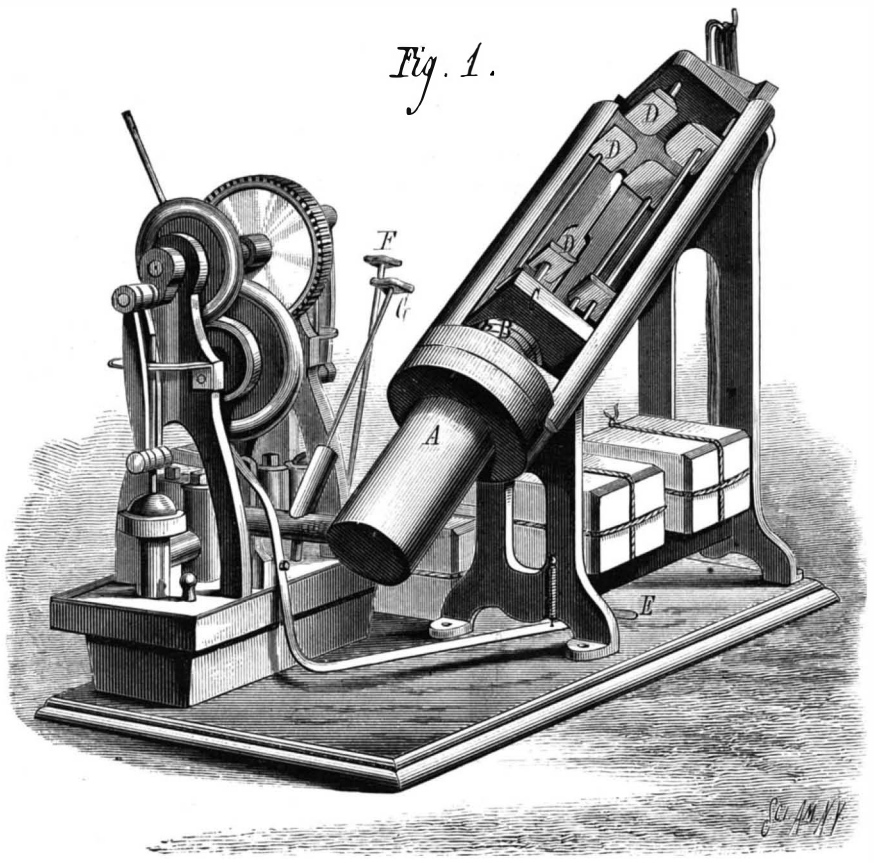
When the form is being printed it is usually done in this way: the paper is first printed on one side, making the indentations all one way; it is then turned and printed on the other side; this operation is called backing up. It makes the same number of indentations as the first impression, and carries with it nearly all of the indentations made by the first impression. These indentations are concavo convex. The sheets now being printed on both sides are folded. The first fold makes the indentations opposites—concave against concave, or convex against convex, depending on which half of the whole sheet it is. The sheets, being usually of double size when printed, are cut before folding; one half of each sheet, when cut, will have the indentations on one side, while the other half will have them on the opposite side. The sheet receiving the second fold, the opposites are multiplied; when it receives the third fold, they are again multiplied; and this multiplication is continued with every fold the sheet receives. The indentations are more easily removed when the sheets are folded than they could be if they were placed from two to six or more between fuller or glazed boards and subjected to great pressure. It will be readily seen that by placing the sheets in the press, flat, the indentations form, to a great extent, a mould or counterpart for each other, consequently requiring more pressure to remove them.

The sheets being folded, and the indentations being opposed to each other, as described, about 500 are placed in the trough of the machine, with end boards to secure an even pressure over the entire surface, and also to prevent the marring of the outside sheets by the cords, and hydraulic pressure is applied, which is so regular that it causes no heat or friction on the sheets being pressed, consequently there is no set-off. The sheets, while under pressure, are tied with cord around the bundles endwise. The machine is then opened, and the bundle removed and set aside, with the pressure retained by means of the tie, until the sheets are wanted for gathering. The bundles are more easily ranked up, take up much less room than is required when they are piled up loose or bundled by hand, and being more compact there is less fire risk. While pressing them as smoothly as the cumbersome hydraulic press, it breaks their backs as effectually as a crushing machine, and takes out all the "kinks," which are wont to bother a binder. After passing through it, the work is more readily handled through all the stages a book has to pass during the process of binding, and is more firm and solid when finished.

It is impracticable to state all the advantages that this new process has over the ordinary methods of dry pressing. The machinery employed will be understood by reference to the engravings. The press is supported in an inclined position for convenience in arranging the sheets to be pressed, and the frame in which the platen moves forms an angular trough for receiving the corners of the sheets to be pressed; the arrangement obviates the necessity of arranging the sheets, and saves a great deal of time, besides insuring accuracy in the position of the sheets.

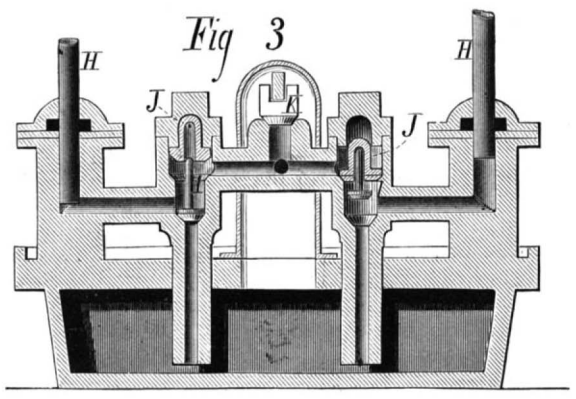
The cylinder, A, contains the plunger, B, having the head, C, which supports the four sections, D, of the platen by means of the short stout standard. The stationary end of the press is similarly arranged, and the sides of the press frame are slotted to permit of tying the bundles pressed by the machine. Before placing the sheets in the press a strong board having beveled edges is placed upon the platen, then as many sheets as are to be operated on are placed in the trough and another board is placed above them. The pressure is then applied by means of the hydraulic pumping machinery, which is set in operation by touching the foot to the pedal, E. The water supplied to the hydraulic cylinder, A, passes through a valve, F. An electric alarm is provided which sounds when the limit of pressure is reached. The bundle is then tied with a strong cord which passes around it in two directions.

Fig. 1.



JONES' PRESSING MACHINE—FRONT.

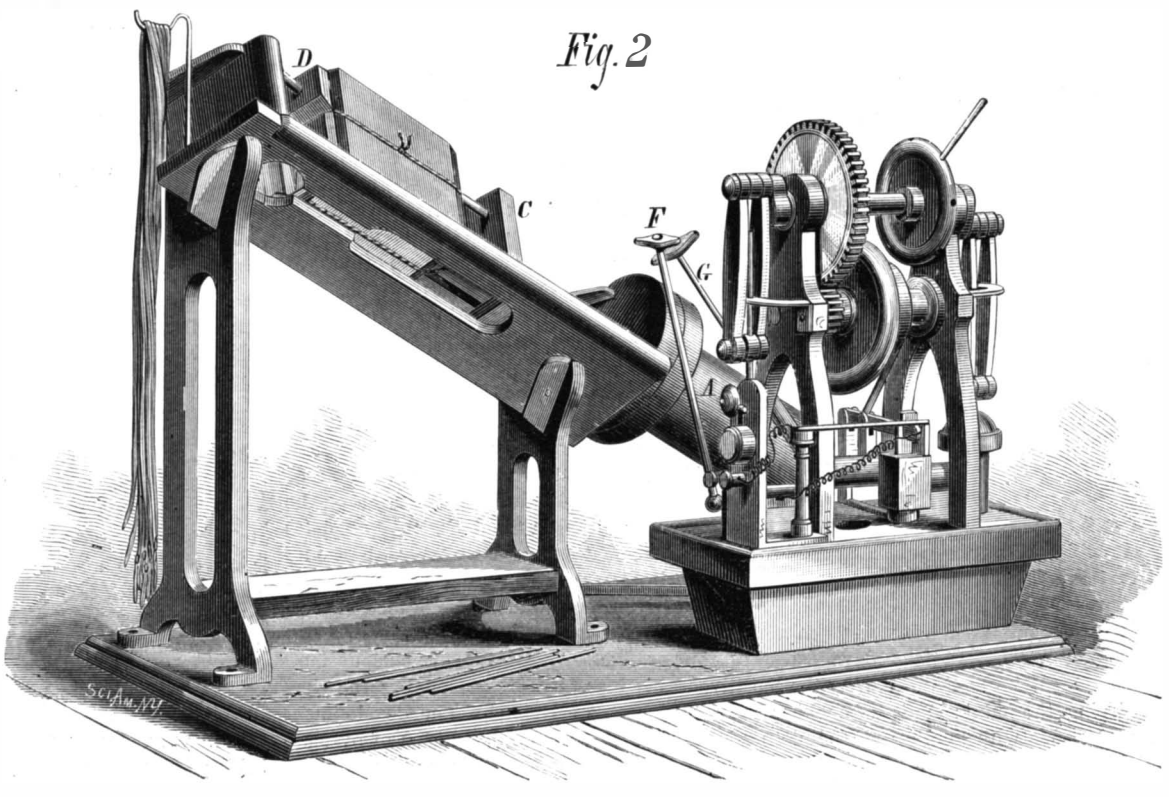
Fig 3



By turning the valve, G, the water in the cylinder, A, is allowed to escape to the cistern beneath the pumps, and the bundle is removed to give place to another. The sheets thus placed under pressure and tied are retained under pressure as long as may be desired independently of the press. The time required is from 10 to 24 hours. The time required to place the sheets under pressure is less than five minutes. The arrangement of valves and pump plungers is shown in Figure 3—H H, being the plungers; I I, the induction valves; J J, the eduction valves, and K, the safety valve. The pumps are mounted on a small cistern, which contains the water supply.

Any further information regarding this invention may be obtained from its inventor, whose address is given above.

Fig. 2



PRESSING MACHINE—REAR VIEW.

Wild Animals in Algeria.

Wild animals are rapidly disappearing from Algeria. The French Government pays ten dollars for every lion or panther that is killed, and about forty cents for every jackal. Last year rewards were paid on 53 lions, 49 lionesses, 9 cubs; 530 panthers, 45 young pathers; 1,072 hyenas; and 14,784 jackals.

How to Print Several Copies of a Letter.

A new process, by M. Chardon, is as follows: Make a zinc tray about a quarter of an inch in depth, and pour into it a warm solution made as follows: Water, 4 ounces; sulphate of baryta, 2½ ounces; sugar, 1 ounce; gelatine, 1 ounce; glycerine, 6 ounces. Write whatever is required to be printed upon a sheet of white paper, using instead of ordinary ink the aniline color known as "violet of methylaniline;" as soon as the writing is pretty dry lay it upon the gelatine surface and rub the back of the paper with the palm of the hand. The ink will be absorbed by the gelatinous product. All that is to be done in order to obtain a *facsimile* of the writing is to lay a sheet of paper upon the writing on the gelatine and rub the back with the hand. From forty to fifty can thus be drawn off in a few minutes. We find that in warm weather plates thus prepared remain too soft and adhesive to work satisfactorily. Better results are obtained when a larger proportion of barium sulphate—say 3½ instead of 2½ ounces—are used and the mixture is heated for an hour on the water-bath.

San Francisco's Big Ferryboat.

The Central Pacific Company's new ferryboat, Solano, measures as follows: Length, 424 feet; height of sides in center, 18 feet 5 inches; height at ends, 15 feet 10 inches; width over guards, 116 feet. The Solano will have two vertical beam engines of 60 inch cylinders and 11 foot stroke. The wheels are 30 feet in diameter, with buckets having a face of 17 feet. Eight steel boilers, each 28 feet in length, will be provided, and will be made in pairs. Four Pratt trusses give a longitudinal stiffness, and connect the deck and bottom of the boat in true bridge style. She is a double-ender, and has four rudders at each end, worked by a hydraulic steering apparatus operated by an independent steam pump. The engines work independently, each moving one wheel, which revolves independently of the others. The boilers are placed upon the deck to prevent the escaping steam from rotting the wood. The hold is divided into eleven watertight compartments, which render her less liable to sink and also strengthen her. Four tracks will be placed upon her decks, which will accommodate 48 freight cars or 24 passenger coaches. Her slips will be provided with aprons 100 feet in length, which will admit of cars being taken aboard without uncoupling from the engine. The Solano is intended to run between Martinez and Benicia, where slips are being built for her. By this route the distance between San Francisco and Sacramento will be but 85 miles, instead of 140 miles by the way of Livermore, and 151 by the way of San Pablo.

Sign of Prosperous Times.

The President of the Board of Emigration in this city informs us that emigrants, at the rate of 3,000 per week, are arriving at this port. A noteworthy feature is the large proportion of Germans and Russians among them, all of whom immediately push westward. He states, moreover, that the arrivals this season are a very superior class, and as such the Western States are to be congratulated in having them added to their permanent population.

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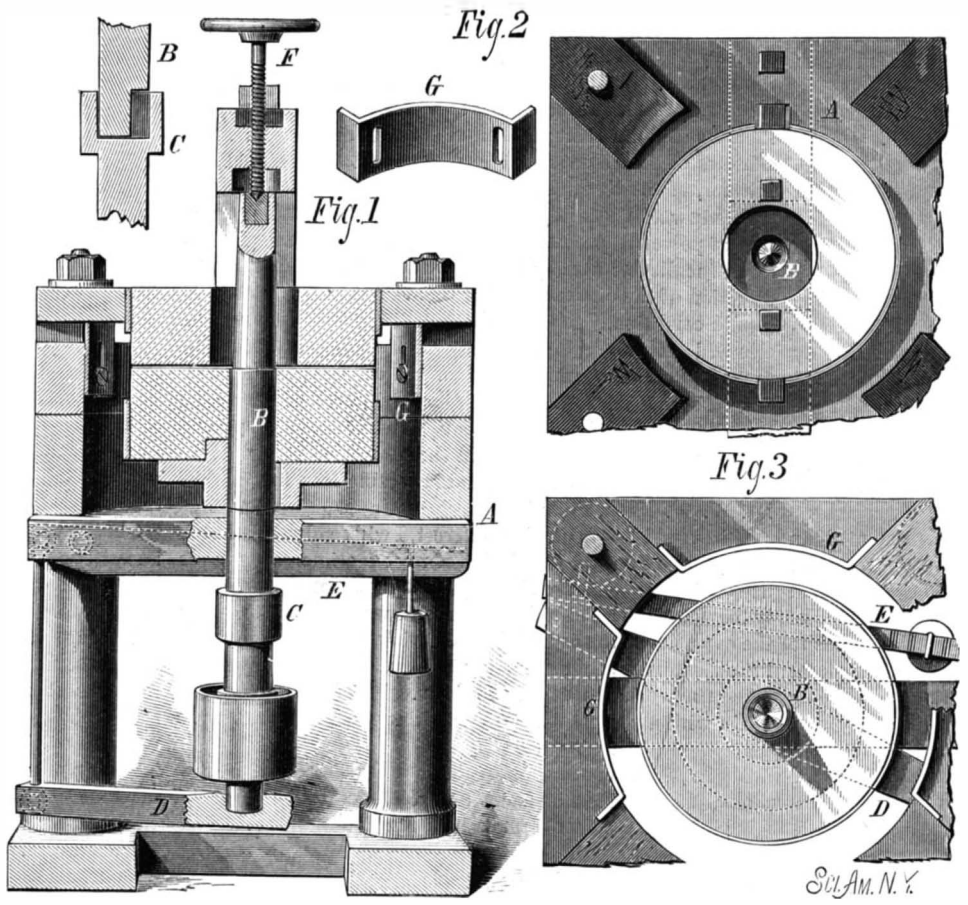
IMPROVED GRINDING MILL.

We give herewith engravings of an improved grinding mill recently patented by Mr. Stephen P. Walling, of South Edmeston, N. Y. The improvement relates to means for adjusting the stones and to the general construction of the mill. Fig. 1 is a central vertical section, and Figs. 2 and 3 are plan views. The mill represented in the engraving is a horizontal mill of the portable class, but the improvements may be applied to vertical and stationary mills.

The husk frame, A, supports the stationary stone and contains the spindle, B, upon which is mounted the running stone. The spindle rests in a step in the lever, D, fulcrumed in the lower part of the frame, A. This lever is connected with the shorter arm of the lever, E, which is weighted sufficiently to overbalance the weight of the spindle and running stone. At the upper end of the spindle there is a hardened steel plug that receives the end of the adjusting screw, F. This screw is prevented from becoming accidentally loosened by a packing of flexible rubber which takes the place of a jam nut. The spindle is held up against the adjusting screw by the counterweight on the lever, E, which keeps the running stone up to its work and at the same time allows it to yield whenever a hard substance chances to get into the mill, and brings it back into its normal position after the hard substance is discharged from between the stones. The adjustable plates, G, fill the spaces in the casing between the pillars and prevent the escape of flour dust. The spindle, B, is made in two parts, which are connected by the coupling, C. This coupling is capable of yielding so that a slight lateral motion in one part of the spindle does not affect the other part. The spindle is provided with means for continuous lubrication, and if by any means it becomes slightly heated the expansion tends to relieve the stones rather than to cause them to bind, as in the ordinary construction. In addition to these advantages the mill can be readily taken apart and the stones conveniently removed for dressing.

Further information may be obtained by addressing the inventor as above.



WALLING'S IMPROVED MILL.

A NEW RAILROAD TIE.

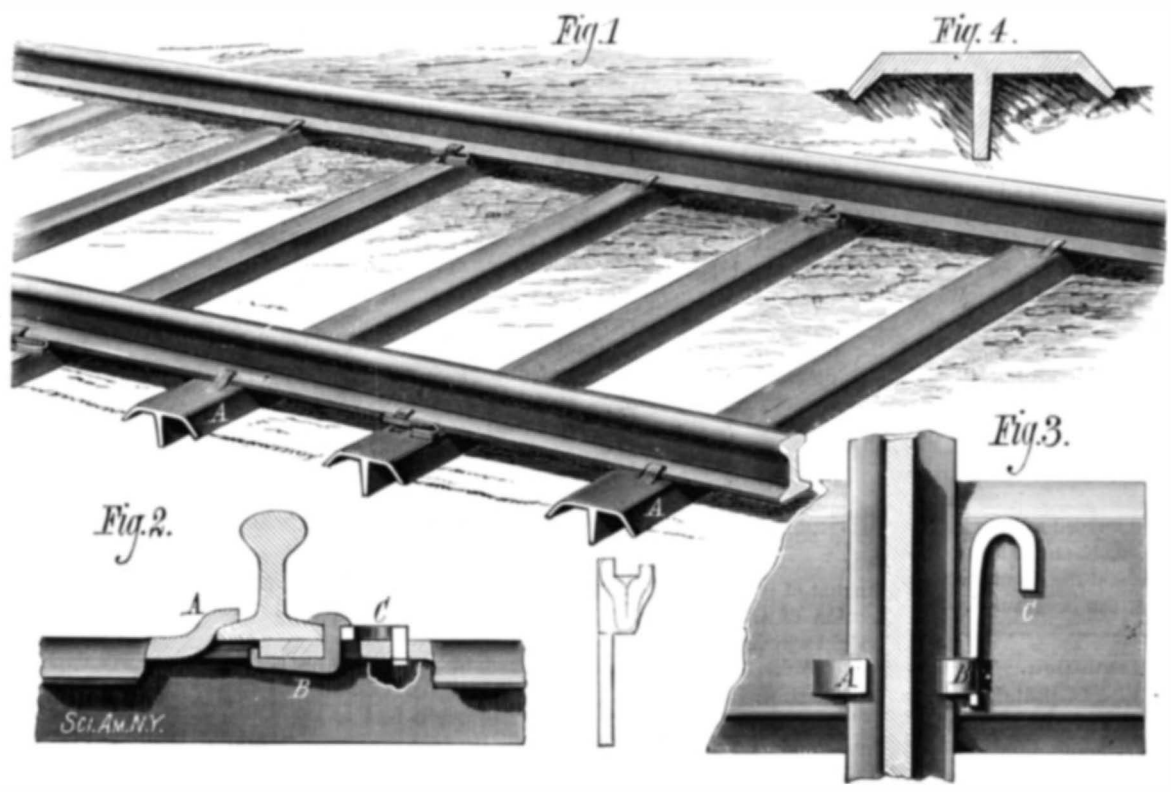
The enormous consumption of timber for railroad ties, especially in this country, where we do not take time to use things to the best advantage, is making the right kinds of wood for the purpose more and more scarce every year. The *Lumberman's Gazette* estimates that as we have now about 90,000 miles of railroads the annual consumption of ties or sleepers alone is 40,000,000, or thirty years' growth of 75,000 acres. This tremendous destruction of cross-tie timber, only certain kinds and sizes of which can be used for the purpose, is using up the stock within reach so fast, and good ties are in consequence becoming so hard to get in many quarters, that railway managers are seriously turning their thoughts toward some substitute. Of course the only available rival of wood is iron, and the price of that article from various causes is, and is likely to be for a long time to come, so low that the difference in price between it and wood as a material for the purpose is not the insuperable objection to its use that it was only a few years ago. Indeed many of the European government railways, notably those of Belgium, have decided to lay only iron ties in the future. The German railway management have also advised the same, and it will doubtless soon be adopted. Some of the English railways are also trying them on a large scale. Taking a series of years, iron, from its almost endless durability, is so much cheaper than wood that it must eventually take its place, not only for railroad ties but for many other structural uses now monopolized by wood.

The accompanying engravings illustrate a new wrought iron cross-tie patented in the United States, May 11, 1875, and April 8 and May 20, 1879, by Mr. Henry Reese, of Baltimore, Md., and for which patents are now pending in England, France, Germany, Belgium, Austria, Italy, and Spain. This tie is claimed to meet fully all the requirements of simplicity, cheapness, strength united with elasticity, ease of construction and of laying in track, and to be in all respects a practical solution of the question.

The large illustration is a perspective view of a section of track laid with this tie. Fig. 1 is a plan view of one end of a tie with the rail fastenings and a section of the rail. Fig. 2 is a side elevation of the same, with part of one flange of the tie and of the vertical web broken away to show the shape, situation, and arrangement of the fastening parts. Fig 3 is a cross section of the body of the tie, and Fig. 4 is an elevation of the spring, made of flat steel, as shown in the perspective view; the dotted lines in the same figure show the same spring as made of round steel.

A, Figs. 1 and 2, show the permanent lug, which is turned up from the upper plate of the tie, and against and under which one base flange of the rail is firmly held, while the other flange is held in the same way by the movable clamp, B, which is pressed firmly against (embracing both) the flange and the top plate of the tie by the spring, C. The part of the clamp, B, which goes under the tie has at its end an upturned toe which rises into the opening left by turning up the lug, A. The object of this toe is to prevent the removal of the clamp from its place in case of the malicious or accidental removal of the spring, C, as the clamp is pressed up to the tie by the ballast and can only be taken out by its removal. The spring, C, rests at its free end under a shoulder of the clamp, B, and its fast end is socketed in a slot in the top plate, and has a hook or projection, shown at *a*, Fig. 4, to go under the top plate and keep the spring in position. The object of reversing the alternate ties end for end, as shown, is to bring the permanent lugs, and also the movable clamps, on both sides of the base flanges of the rails. The effect is obvious. The springs by their reaction against the tie draw the permanent lugs with force against the rail base, and as these lugs alternate on opposite sides of the bar at short distances apart, the effect is to hold the rails firmly to the ties and make a solid substantial superstructure, at the same time allowing the rails to expand and contract with summer's heat and winter's cold.

Further information may be obtained from the patentee at 209 W. Pratt Street, Baltimore, Md.



REESE'S RAILROAD TIE.

ENGINEERING INVENTIONS.

An improved governor for marine and other engines, in which the speed is controlled by centrifugal balls, has been patented by Mr. Samuel Whitney, of Wheeler, Ala. In this device a worm gear is acted upon by a pinion in such a way as to rotate the governor spindle when the engine runs normally, but when the speed is suddenly increased, it will lift the valve stem and check its engine.

A meter for measuring the amount of steam consumed for heating purposes in stores, houses, etc., has been patented by Mr. Joseph A. Cook, of Auburn, N. Y. It consists of a reservoir for receiving water, and a float placed in the reservoir and moved by the water, so as to operate a pair of arms that move the registering mechanism. The same inventor has patented a self-adjusting valve for regulating the pressure and supply of steam for heating purposes.

An improved railway gate, constructed so that it will be opened by an approaching train and held open until the train passes, has been patented by Messrs. Lewis C. Pope and Obed N. Tencher, of Paola, Kan.

Mr. Samuel G. Martin, of South Amboy, N. J., has recently secured two patents for steam steering apparatus for vessels. By the use of two separate piston heads, in a single cylinder, the rudder can be held centrally or to either side. For double-ended vessels two steam cylinders are used, and chains pass to both rudders from the pistons, so by the movement of the pistons the rudders will be turned.

Mr. Horatio Nelson, of New York city, has patented an improved enameled screw propeller which will not corrode, and works in the water with less friction than the ordinary wheels.

An improved balanced steam engine has been patented by Mr. James O. Baird, of Brooklyn, N. Y. This engine has three cylinders, with pistons working alternately upon diametrically opposite cranks. The engine is provided with a balanced steam valve of peculiar form.

An improved dynamometrical governor has been patented by Mr. Ernest A. Bourry, of St. Gallen, Switzerland. In this device, by suitable appliances, the variations of the power load, or resistance, are utilized directly to operate the throttle valve.

Mr. John L. Custer, of Bonaparte, Iowa, has devised a machine for excavating ditches to a true water line and finishing them for the laying of drain tile. The construction of the machine cannot be readily described without an engraving.

Mr. Paul S. Forbes, of New York city, has invented a steam boiler provided with serpentine fire flues, so arranged that their bends or coils may pass alternately through the upper part of the water space and the lower part of the steam space. It is said that with this construction steam will be generated faster and with less quantity of fuel than when boilers of the ordinary construction are used.

Mr John H. Fairbank, of McKeesport, Pa., has invented an improved balanced valve for steam engines. The advantages of this valve over others lie in its cheapness and simplicity, its fewer number of parts, and the ease with which it can be adjusted or loosened or tightened upon the valve seats.

An improved dredging apparatus has been patented by Mr. John Grant, of New Orleans, La. This invention is an improvement upon the dredging apparatus for which letters patent were granted to the same inventor, July 18, 1876. The present invention consists in a vertically adjustable deflecting plate extending throughout the broadside of

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the boat, and mounted upon a framework which is sustained upon two sliding spuds, and is made vertically adjustable as a whole. It also consists in combining with the deflecting plate a longitudinally reciprocating rake, which is made adjustable with the deflecting plate, and which is used to stir the bed whenever it is of such a nature as not to be easily disintegrated by the unassisted action of the water.

An improvement in brakes for wagons and cars has been patented by Messrs. Mathew C. Franklin and Nathaniel Landrum, of Prairie Lea, Texas. The invention consists in a peculiar arrangement of the brake bar, a cam bar, and a foot lever, which insures a powerful action.

Mr. James Montgomery, of Jersey City, N. J., has invented an improved car wheel, which consists in providing a car wheel with slots which radiate from the eye, and in reinforcements around the edges of said slots; also in the construction and application of an elastic packing to inclose three sides of the tread piece of the wheel and form a bed for the tread in the peripheral groove of the wheel.

An improvement in car couplings has been patented by Mr. Milton Logan, of Foxburg, Pa. The invention is an improvement upon letters patent granted to the same inventor, July 30, 1878, and relates to means for operating the hook-ended draw bars shown in that patent. The coupling may be readily operated from either the platform or from the ground at one side of the car. It is also connected by a rod with the short arm of the lever pivoted on the top of the car, so that it may be operated from the top.

Mr. William Loudon, of Superior, Neb., has patented an improvement in pumps, the object of which is to prevent the accumulation of sand around submerged pump cylinders and the stoppage of the inflow of water to the cylinder. The cylinder is provided with a cylindrical shield, placed so as to leave a space between it and the cylinder, so that the water can pass to the cylinder and enter the same, said shield being composed of foraminated cylindrical shells, with a layer of wire gauze between, which offers a free passage to the water, but prevents the sand from coming in contact with the cylinder.

An improved railroad switch, patented by Mr. William L. Potter, of Mechanicsville, N. Y., consists in an arrangement of movable guide bars that cause the wheels to take the track for which the switch is set and permit the passage of a train from either direction or upon either track without danger of the wheels leaving the rails and without jolt.

Mr. Joseph W. Riley, of Hollidaysburg, Pa., has patented an improvement in side trusses for bridges. The trusses are formed of the longitudinal bars, cross bars, cross rods or bolts, studs, and elliptical braces, arranged so as to secure the greatest possible rigidity and strength with the smallest expense.

An improved device for cutting railroad rails, patented by Mr. John M. Peterson, of Michigamme, Mich., consists of two arms, pivoted together at one end, and the opposite free ends adapted to receive cutters, which are applied to opposite sides of the rail, and forced against the same by a ratchet lever screwing a nut upon a shaft joining the ends of the arms, whereby the knives or cutters are made to cut through the rail.

Recent Decisions Relating to Patents.

BY THE U. S. CIRCUIT COURT—EASTERN DISTRICT OF VIRGINIA.

Sayles v. Richmond, Fredericksburg and Potomac Railroad Company.—1. Where a patent has been granted for fourteen years and extended for seven years, a suit may be brought against an infringer for profits that accrued at any time during the twenty-one years, if brought within six years after the extended patent expires.

2. The United States circuit court has jurisdiction of suits in equity relating to patents between citizens of different States. It is doubted whether the circuit court has jurisdiction in patent cases, except by injunction, where the parties are citizens of the same State.

3. Where it is sought to recover in equity profits resulting to the defendant from using, through a series of years, a mechanical invention without the owners' consent or authority, which profits do not consist in specific sums of money received by the defendant in so using the invention, but simply consist in the advantage and convenience derived from using them, and such advantage is a matter to be estimated as a whole, it is not a matter of accounts, and, therefore, a bill cannot be sustained for an account. Where there is an adequate common law remedy, equity cannot take jurisdiction of a bill for profits arising from the use of a patent solely on the ground of constructive trusteeship.

BY THE ACTING COMMISSIONER OF PATENTS.

Ex parte Holcomb.—Even though an old form of article is much improved and rendered far more salable by a certain method of making it, yet, as that method consisted in the employment of means within the knowledge or grasp of those acquainted with the business, such method does not constitute an invention within the statutory enumeration of inventions for which letters patent can be granted.

American Institute Exhibition.

The forty-eighth exhibition of this Institute will open September 17th, in this city. Parties having novelties which they intend to bring to public notice should at once address the General Superintendent for blanks and information. The medals, it is said, have been increased, and special awards will be made upon a number of articles.

Correspondence.

Magnetization of Molten Iron.

To the Editor of the Scientific American:

In your issue of July 5th I notice a report of "Magnetizing Molten Iron," the experiment having been made by Mr. Chernoff and reported by Dr. C. W. Siemens. I do not know that it is a matter of much importance, but believe I was the first person to try the experiment, which I did in the foundry of the Fall River Iron Works in 1872. I had never thought it important enough to report in the scientific press, though I at the time reported it to some of my friends, among them Prof. John H. Appleton, of Brown University; Prof. Barker, of Pennsylvania University; and afterward Prof. Farmer, of the U. S. Torpedo Station.

I had two objects in view, one of which was the production of powerful permanent magnets, the other the production of malleable iron by a polarization of the atoms in the direction of the current, during the change from a molten to a solid condition. In the first I failed, as I believe every one else will; for, since heat destroys a magnet, heat will also prevent permanent magnetization. In the second I succeeded to a certain degree, and samples of the iron I made, heated to a cherry red, and drawn under the hammer to chisel points, are now, or were at one time, in the possession of Mr. A. A. Pope, President of the Cleveland Malleable Iron Co., and of Dr. W. W. Keen, Philadelphia.

If it would be of sufficient interest, I will send you a sketch of my apparatus and description of my experiments. I made use of the 60 cup Bunsen battery, of Brown University, kindly loaned me by Prof. Appleton, and was unable to carry the experiment to the end I would wish, because of the evolution of nitrous acid from my battery, which nearly suffocated the workmen at the foundry. I would like to try it again with a powerful Brush machine, for the results were very interesting.

My bars of iron came out of the mould solid, and if hollow ones were produced by some one else, the reason must be sought in some defect of making the mould or pouring.

SPENCER BORDEN.

Fall River, Mass., July 11, 1879.

Edison's Dynamometer.—An Improvement Suggested.

To the Editor of the Scientific American:

Noticing in your last issue the dynamometer invented by Mr. Edison, it occurred to me as rather odd for him to adopt such coarse devices for measuring power, however effective they may be. Why did he not apply the principle of the tasimeter to this purpose? It seems feasible enough to a layman. Suppose the driving and driven shaft to be placed axially in line, but not connected; provide each with an arm, allow the arms to overlap each other at the ends, and place between the ends of the arms a carbon button having electrical connections as in the tasimeter. The button would be pressed more or less, according to the power consumed by the driven shaft, and its electrical conductivity would be changed with every variation of pressure.

To insure accuracy in the indications of the galvanometer, another tasimeter arranged to receive a variable amount of pressure should be connected with a switch, so that it could at any moment be thrown into the electrical circuit in place of the button carried by the arms.

If the tasimeter is so sensitive and so accurate for exceedingly small pressures, why should it not be more accurate in indicating heavy pressure? X.

The Edison Dynamometer.

To the Editor of the Scientific American:

In your issue of July 26th, you remark that Mr. Edison's new dynamometer is "in principle something like other dynamometers." Are you aware how much it is like one devised by Mr. Horatio Allen and used in the government experiments on steam expansion in 1865?

As described by Prof. Fairman Rogers, at a meeting of the Franklin Institute, March 16th, 1865, and published in my report as secretary, it appears as follows (see *Journal of the Franklin Institute*, vol. 49, page 281):

"The shaft being cut between the engine and the first fan, a grooved pulley is keyed upon the engine shaft and one exactly similar upon the fan shaft. An endless rope is laid over these two pulleys in such a way that the bight of the rope hangs down before and behind. In these bights are hung two grooved pulleys of a diameter equal to the distance of the large pulleys apart, and to these smaller pulleys equal weights, so that the rope is held tightly in the grooves of the large pulleys. The engine pulley being turned by the engine, sufficient extra weight is added to the hanging pulley on the driving side of the rope to equal the strain on the rope, which represents the resistance of the fans, when the whole system will be in equilibrium, and the amount of power to drive the fans will be measured by the tension of the rope, and consequently by half the extra weight which has been added.

"If the resistance of the fans increases by any means, the weight rises; if the resistance diminishes, the weight falls, and a spring balance is fastened to the weight and to the floor to take up these irregularities.

"A rod attached to the weight and carrying a pencil, moving over the surface of a cylinder running from the shaft, serves to register the power required to run the fans.

"By the apparatus the friction of the fan shaft can be measured and any change in the resistance from varying density of the air is immediately indicated."

HENRY MORTON.

Stevens Institute of Technology,
Hoboken, N. J., July 18, 1879.

Ocean Currents at St. Paul's Rocks.

These rocks are about 540 miles distant from the coast of South America, and 350 miles from the island of Fernando do Norhona. The group of rocks is scarcely more than half a mile in circumference, and their highest point is only 64 feet above sea level.

Their smallness is the striking feature in their appearance as they are approached. They show themselves as five small projecting peaks, which are black at their bases and white with birds' dung on their summits. A yellowish white band shows out about tide mark.

The sea was dashing up in foam at the southeast end of the rocks, and a long line of breakers stretching from the opposite end marked the course of the equatorial current. The birds were to be seen hovering over the island in thousands. Only three kinds inhabit it—two noddies and the booby. The noddies (*Anous stolidus* and *A. melanogenys*) are small terns or sea swallows, black all over, with the exception of a small white patch on the head. The booby (*Sula leucogaster*) is a kind of gannet. The full grown birds are white on the belly, with a black head and throat, the black ending on the neck, where it joins the white in a straight conspicuous line. The back is dark. The younger birds are brown all over. Some few of both birds soon came off to have a look at the ship.

We moved gradually up to the islands, sounding as we went; the Captain and Lieutenant Tiyard mounted into the foretop and steered the vessel from thence, looking out for rocks. The water is deep right up to the rocks, and a hawser was sent on shore in a boat and made fast round a projecting lump of rock, and the ship was moored by means of it in about 100 fathoms of water, although not more than 100 yards distant from shore.

Such an arrangement is only possible under the peculiar circumstances which occur here. The wind and current are constantly in the same direction, and keep a ship fastened to the rock always as far off from it as the rope will allow. I never properly realized the strength of an oceanic current until I saw the equatorial current running past St. Paul's Rocks.

Ordinarily at sea the current, of course, does not make itself visible in any way; one merely has its existence brought to one's notice by finding at midday, when the position of the ship is made known, that the ship is 20 miles or so nearer or farther off from port than dead reckoning had led one to suppose she would be, and one is correspondingly elated or depressed.

But St. Paul's Rocks is a small fixed point in the midst of a great ocean current, which is to be seen rushing past the rocks like a mill race, and a ship's boat is seen to be baffled in its attempts to pull against the stream.—*Mosely, Notes by a Naturalist.*

NEW AGRICULTURAL INVENTIONS.

Mr. Joseph S. Noyes, of Ransom Center, Mich., has patented an improved gate, which is supported on a hinged bar, so that it may be raised or lowered by the simple movement of a lever. It is also provided with a peculiar arrangement of latches.

An improved implement for leveling and smoothing the ground in preparing it to receive seed, has been patented by Mr. Charles A. Meeker, of Green's Farms, Conn. The invention consists in the combination of two sets of rollers and disks, the disks of the rear set being placed at a less distance apart than those of the forward set. The implement is provided with a scraper.

A device by which the sides and tops of hedges can be trimmed accurately and quickly, and with much less labor than by other trimmers now in use, has been patented by Mr. Henry Unkrich, of Fairfield, Iowa.

An improved machine for trimming hedges, which is so constructed as to trim the top and one side of the hedge at one operation, and which may be adjusted to work upon level or inclined ground, is the invention of Messrs. Albert G. Rogers and Harlow M. Freeman, of Lathrop, Mo.

Mr. Morris C. Pennock, of Alliance, O., has invented an improvement in churns, which is provided with a novel form of rotary dasher, and with slotted journal bearings and other new points, which render it convenient and efficient.

An improvement in the class of machines that are adapted for both distributing guano, or other fertilizer, and depositing and covering seed simultaneously, has been patented by Mr. John W. F. Gilreath, of Cassville, Ga. The improvement consists in the arrangement of parts by which the guano and seed conducting tubes or sprouts, and also the furrow-openers and seed-coverers, are simultaneously raised and lowered by the same means.

M. DE LESSEPS has issued the prospectus of the Darien Canal Company. The capital is fixed at 400,000,000 francs. Only 125 francs per share will be called up in the first instance. Interest at the rate of five per centum will be paid on the actual money received during the course of construction. M. De Lesseps estimates an income of 90,000,000 francs from the canal.

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The Future of Texas.

A recent traveler in Texas, after visiting every section of the State reached by railroads, comes to the conclusion that the possibilities of the State have been vastly overrated. Toward the end of a very intelligent series of letters to the *Tribune* he says:

Texas contains 274,356 square miles. It would make five States as large as Illinois, but no just inference can be drawn from its size alone as to its capacity for sustaining population. Illinois contains fully as much first-rate agricultural land as Texas. The whole of Eastern Texas, embracing a territory larger than Ohio, consists of pine barrens, with a little arable land along the valleys of the streams. Out of the valleys the soil is sandy, and would not pay to clear and cultivate. This region will never be thickly settled. It now supports a scanty population of lumbermen and very poor farmers, who cultivate little patches along the creek bottoms. The larger streams are bordered by narrow tracts of good soil where there are some large cotton plantations. This part of the State is not a new country, and except on the opening of the lumber industry by the building of railroads, it has had no growth in recent years. Something might be done with fruit culture—a few peach orchards at Palestine have proved remarkably profitable, their product bringing high prices in the St. Louis market; but the population lacks enterprise to develop any new branch of industry.

West of the pine barrens is a broad belt of rich, black, rolling prairie country, stretching from the Red River southward almost to the Gulf, and having an average width of about 200 miles. This region may be roughly compared in area to the State of Illinois. It contains some scrub-oak forests, where the soil is poor, but fully nine-tenths of the surface is first-rate land, as good as the best prairie land in the Northwest. Rich and inexhaustible as is the soil, however, this section shows little tendency toward dense settlement. The northern portion is being subdivided into small farms, and is filling up with a good, industrious white population, but the central and southern portions naturally run to large cotton plantations. Cotton is the best crop in this whole region. Central Texas is the best cotton country in the south, and is now producing one-sixth of the whole cotton crop of the United States. It is not nearly as good a corn country as Illinois and Kentucky; and for the production of wheat, no part of it can compare with Minnesota, Iowa, and Kansas. Root crops do not succeed, the tubers being large, coarse, and watery. Some fruits do tolerably well, particularly peaches and pears, but little attention is given to raising them. Apples are brought from the north.

Further west is a broad belt of hilly or rolling country, consisting of prairies and post-oak or black-jack openings, that is too dry for agriculture, but is well adapted for grazing. This is the great cattle region. It stretches from the Red River to the Rio Grande and the Gulf. Some portions of it may eventually be cultivated, if the rain-fall should increase by climatic changes which are said to be going on along the eastern border of the whole arid region from Montana down to Mexico, but nine-tenths of its surface will always be devoted to pasturage, and will consequently support only a scanty population of herdsmen. Still further west is an immense arid region, comprising about three-fifths of the whole surface of the State. Some of it is valuable for grazing; a little, lying close to streams, can be cultivated by irrigation. A great deal is absolute desert, growing nothing but cactus and chaparral. Veins of copper and iron have been discovered in the mountainous districts, and when they are opened, as they will be when the Texas Pacific Railroad is completed to the Rio Grande, considerable population will be brought in. With all the resources of mining, agriculture by irrigation, and grazing possessed by this immense region, its population will, however, always be inconsiderable.

As a whole the State is regarded as unlikely ever to have a population greater than Ohio. A moderately dense farming population in the center, flanked by a sparse population in the east and a still sparser one in the west, grading off to a region with no inhabitants worth mentioning, is all Texas can look forward to.

Bank of England Notes.

The financial editor of the Philadelphia *Ledger* states, on the authority of official report, that the notes of the Bank of England are made from pure white linen cuttings, never from rags that have been worn. They have been manufactured for nearly two hundred years by the same family, the Portals, Protestant refugees. So carefully is the paper prepared that even the number of dips into the pulp made by each workman is registered on a dial by machinery, and the sheets are carefully counted and booked to each person through whose hands they pass. The printing is done by a most curious process in Mr. Coe's department within the bank building. There is an elaborate arrangement for securing that no note shall be exactly like any other in existence. Consequently there never was a duplicate of a Bank of England note except by forgery. According to the *City Press* the stock of paid notes of seven years is about 94,000,000 in number and they fill 18,000 boxes, which, if placed side by side, would reach three miles. The notes placed in a pile would be eight miles high; or if joined end to end would form a ribbon 15,000 miles long; their superficial extent is more than that of Hyde Park; their original value was over $15,000,000,000, and their weight over one hundred and twelve tons.

A NEW OPTICAL DELUSION.

Mr. Sylvanus P. Thompson, Professor of Physics at University College, Bristol, England, presented a very peculiar optical delusion at the last meeting of the Société Française. Upon examining the discovery of Mr. Thompson it will be seen that it consists of two distinct phenomena, verified by the annexed engravings.

The first stroboscopic circle consists of a series of concentric rings about one twentieth of an inch in width and about the same distance apart (Fig. 1). It is not positively necessary to adhere to these dimensions, for the same can be varied in size in proportion to the audience that is to view the experiments. If the illustration is moved by the hand in a small circle without rotating it, or if it is given the

FIG. 1.

same motion that is required to rinse out a pail, the circle will revolve around its center in the same direction that the drawing moves, and will complete a revolution as the drawing completes its circular motion.

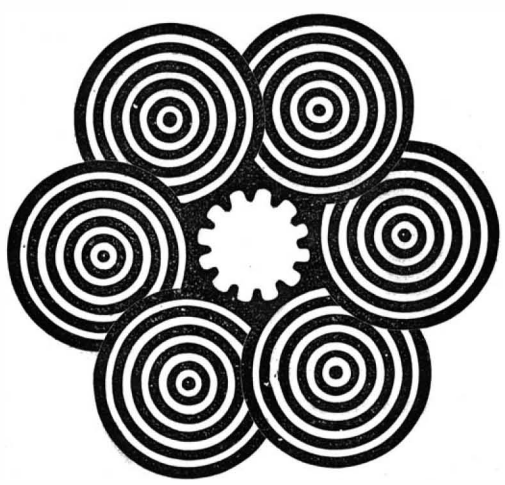
For the second experiment a black circle is drawn, the interior of which is provided with a certain number of equidistant teeth (Fig. 2). The drawing being moved in the same manner as above described, the toothed circle will also revolve, but in the contrary direction.

FIG. 2.

The movements are especially interesting and entertaining when the figures are combined as shown in Fig. 3.

The same result is obtained with other concentric curves as well as with circles. By means of a photographic transparency Mr. Thompson was enabled to throw the figure on a screen on a very large scale. The glass plate being moved as before described, caused the figures on the screen to rotate. In this case, also, each circle appeared to rotate around its own center.

FIG. 3.



No explanation can as yet be given for these curious and interesting facts. Mr. Thompson does not believe the property of the retina to retain images for a certain time can account for this, and we are of the same opinion. Without intending to produce a new theory, Mr. Thompson thinks it best to compare this with some other well known phenomena, from which a new property may be attributed to the eye.

Brewster and Adams have described phenomena which are equally curious and are analogous to those of Mr. Thompson. They say the eye has the property of "compensation;" that is, if an object or a movement acts upon the eye for a certain time, a sensation complementary to the real action is produced. For instance, if we gaze at the rocks in a cascade and then at the cascade alternately, for a short time, the rocks will appear to move upward; or if we examine a stream below a cascade or waterfall, we will notice that the water flows much faster in the middle than at the sides of the stream. If we look at the middle and sides alternately the water will seem to flow backward.

These are a few of the phenomena that might be compared with those of Mr. Thompson, and which may arise from a common cause.—*La Nature.*

New Curiosities at the Smithsonian Institution.

A number of interesting specimens have, according to the Washington *Republican*, been recently added to the ethnological division of the Smithsonian Institution, among the most important of which are the following: A carved figure of a man's head, made from iron pyrites. It was found in Southwestern Mexico, and is supposed to have been an amulet, belonging to a great cazique, during the reign of the Aztecs. The work is highly polished, and presents a beautiful green and gold appearance. The eyes, nose, and teeth are brought out in bold relief, the former being composed of opals, which gleam like sparks of fire. The features are of the most pronounced Aztec type. In a large cave, about two miles from Silver City, Col., there were found some specimens of ancient remains, which are supposed to have been made by the Pueblo people. They consist of arrows, which still have remnants of their sinew shaftings, rain gods, and fetiches in carved and painted wood, tribal totems, and bundles of straw bows and arrows. All these articles are in a remarkable state of preservation, and it is thought that the cave in which they were found was formerly used as a burial place. The entire collection was presented to the Smithsonian, and will be placed on exhibition in a few days. Probably the most important relic that has been added to the museum in a long time is an obsidian vase, made from itztle, or volcanic glass. The workmanship on this vase is perfect, not a flaw having been discovered in the work. It represents a monkey in a sitting posture, with his head bent slightly forward. In the back and shoulders are apertures in which articles for ornament were placed. The carving is exquisite, and shows what perfect lapidaries the semi-civilized people who made it were, as the material of which it is composed is considered the hardest to work in, owing to its brittleness. This relic was also found in the Aztec country of Southwestern Mexico.

On the first floor, in the main hall, stands another curiosity which deserves particular attention. It is a large case, 9 feet by 4½ wide, containing numerous species of snakes, all of which are alive. Through the top, which is covered with glass, the movements of the reptiles can be plainly seen. The cage is filled with stumps of trees, grasses, ferns, and sand, and an artificial lake keeps the ground continually moist. There the reptiles have full sway, and, although somewhat repulsive, their cage is always surrounded with curiosity lovers. Some of the varieties are: coachwhips, indigo or gophers, chicken, black and garter snakes. A king snake is also among the collection, and has to be carefully watched, as he is fond of hugging his companions, and very frequently kills them, after which they make a meal for his highness. This snake is the mortal foe of the rattlesnake, who always comes out second best in their fights.

The work on the annex to the Smithsonian, in which are to be stored the Centennial exhibits and contributions from foreign governments to the United States, progresses rapidly, a large force of workmen being employed. The brick work on the lower story is nearly completed, and the beams for the floors will be placed in position during this week. Nearly two and a quarter acres will be covered by the new building, and when completed it will be a great ornament. A visit to the Smithsonian will well repay all lovers of interesting and curious relics.

Hygienic Effects of Sea and Mountain Air.

This is the time of year when many families leave their homes in the city, for the more invigorating mountain or seashore air, anxious to go where they may derive the most health giving benefit, and still are undecided which way they will go, to the mountains or seaside. To such persons the following extract from a recent work by Dr. C. Alberto, a celebrated Italian physician, may be an aid in helping them to decide:

"The marine air," says the learned doctor, "produces the same benefit as that of the mountain, but each has a different *modus efficiendi;* the former acts more forcibly and energetically on the constitution which retains some robustness and internal resources to profit by it, while the second acts more gently, with slower efficacy, being thereby more suitable to the weaker and less excitable organizations. From this important distinction, the conscientious physician, who takes the safety of his patient much to heart, ought to be able to discriminate whether the alpine or the marine atmosphere is the better suited to the case he has before him."

MM. BANCEL and Husson have communicated to the Academy of Sciences observations on the phosphorescence of the flesh of the lobster. They consider it due to a fermentation in which carbo- and phospho-hydrogens are liberated, and which is destroyed by putrefaction, just as the bacteria of carbuncle are destroyed by the vibriones of putrefaction

NOVEL USE OF ETHER.—A prisoner, named Uhlmann, recently barricaded himself in his cell at Vevey, Switzerland, and defied the gendarmes to take him before the judges. It was not thought advisable to shoot him, and the court would not wait till he was starved into surrender, so ether was thrown into the cell until he became sufficiently stupefied to be harmless.

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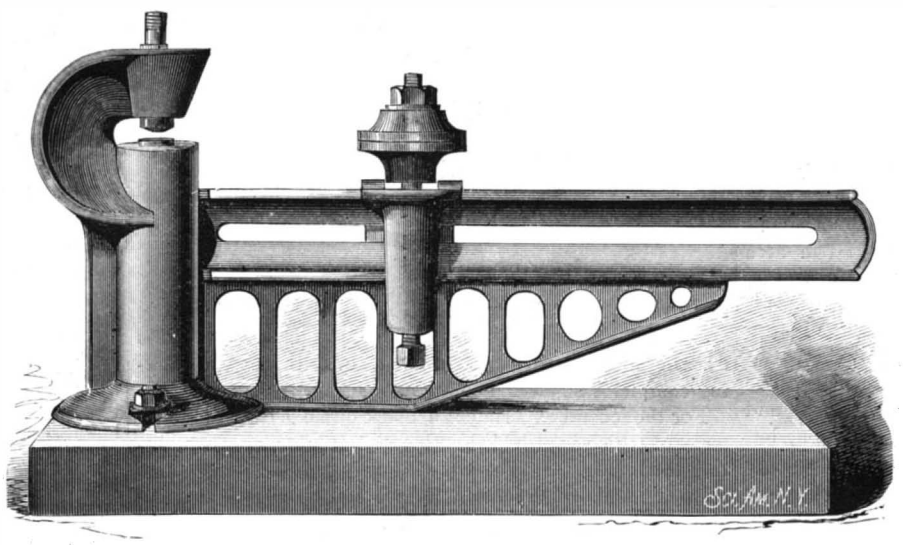
IMPROVEMENT IN SAW GUMMING.

The work of gumming a saw properly and quickly without injury to the saw plate requires the use of appliances perfectly adapted to the purpose. Improvements in this class of mechanism, which facilitate the process and give more satisfactory results, will be examined with interest by those engaged in this branch of industry.

The leading peculiarity of the saw gummer, represented in the accompanying engraving, is an arrangement by which the punch, when struck by the hammer, is driven entirely through the perforation in the saw plate and out of the machine This is effected by means of a flaring hole in the die and also in the die support In this way the liability of springing the plate, by backing out the tightly fitting punch from the perforation, is avoided.

In connection with the punch, there is a tubular guide, with a vertical bore corresponding to it so that the punch is accurately guided, and supported at all points against lateral deflection The different punches are accompanied by sleeves of uniform external diameter, but accurately fitted internally to its punch. The saw is held firmly on the arm by suitable devices which slide on the horizontal arm, and are easily adjusted to different diameters.

The gummer is the invention of Mr. Wm. Tucker, East Brookfield, Mass. Mr. C. A. Sibley, of same place, is general agent, to whom all communications should be addressed.



TUCKER'S SAW GUMMER.

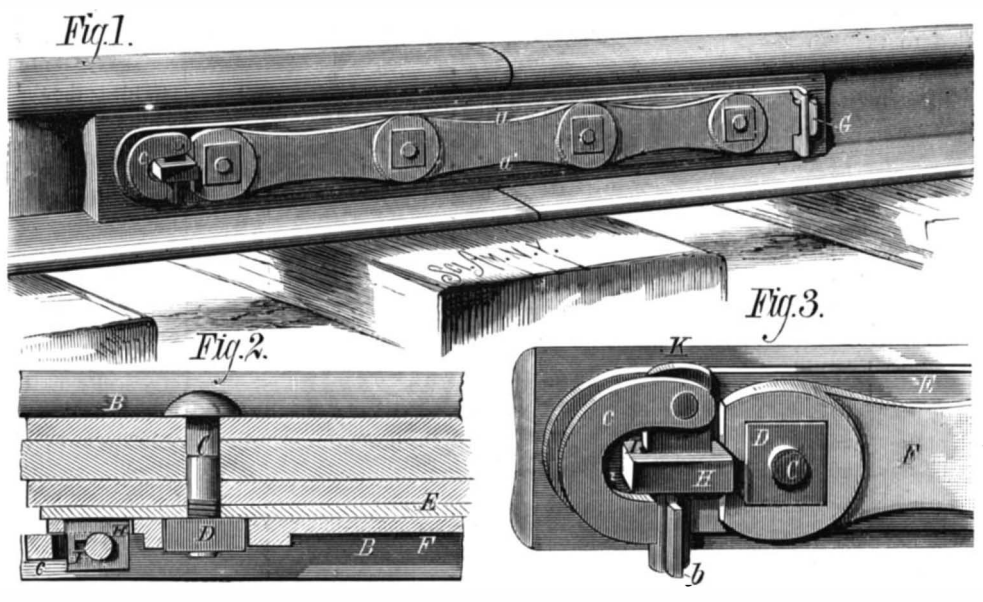
A New Great Gun.

Trial was lately made at Woolwich, England, of the new 100 ton gun. The shot with which it was loaded weighed 2,010 lb. The gun was fitted with a gas check. Its diameter was very little less than that of the bore, which has a caliber of 17¾ inches, increasing to 19¾ inches in the powder chamber. The thickness of the metal at the muzzle is about 5 inches only, but at the breech end the chamber is surrounded with a wall of iron 2 feet 5 inches through, making the maximum diameter 6 feet 6 inches. The gun is 36 feet in length, of which the bore occupies 33 feet, and the total length of gun and carriage when run out for firing is 44 feet. The cartridge, consisting of 440 lb. of cube powder, strongly bound in canvas and stiffened by wooden bands, was rammed home, occupying 5 feet of the bore, and then followed the projectile, the length of which was 2 feet 8 inches. The gun was fired by electricity from the instrument room, and recoiled a considerable way up the platform, but suffered no damage either to itself or the carriage. The screens registered a velocity of 1,590 feet per second, but the projectile was found to have broken up, which may have affected the result.

IMPROVED NUT LOCK.

The annexed engraving represents an improved nut lock recently patented by Mr. Moses H. Grubb, of Vincent, Pa. It is designed especially for connecting the rails of railroads, but it may be used for other purposes. The engraving represents a rail joint formed by the meeting of two rails. The usual fishplates, B, are placed upon opposite sides of the rails and fastened by the bolts, C. The lock is formed of two plates of metal, E and F, which are hinged together at G. Before the nuts are placed on the bolts the part E of the lock is put in place, the nuts are then turned on. The part F is then made to engage the opposite part of the hinge at G, and is placed parallel with the plate, E, so that the holes formed in it receive the nuts on the bolts. At one end of the plate, E, there is a staple which projects through a slot in the plate, F, and receives the key, K, which holds the plate, F, securely in place. The key, K, has a feather which passes through a slot in the staple and is turned to prevent it from jarring loose; its looped and swiveled handle is then turned down against its lower end, preventing it from turning or being accidentally thrown out of place.

In some cases the inventor employs a ring like that shown in Fig. 4, instead of the key. The advantage of locking or unlocking all of the nuts at once will be apparent, and it will also be admitted that this form of nut lock has the advantages of simplicity and security.



GRUBB'S NUT LOCK.

A Meteorite in Iowa.

Professor S. F. Peckham says, in a letter to the *American Journal of Science*, dated Minneapolis, May 29, 1879: I have the pleasure of informing you that, on the 10th of May, a meteor exploded and fell in full daylight at 5 P.M., at Esterville, Emmet County, Iowa. One of the fragments, weighing about 500 lb., fell on railroad land and was dug up from a depth of fourteen feet in a stiff clay soil. Another smaller portion, weighing about 170 lb., fell on the farm of A. A. Pingrey at a distance of two miles from the first. Many smaller pieces of a few ounces or pounds weight, were scattered in the vicinity. The smaller mass fell upon a dry knoll and penetrated the earth vertically to a depth of 4½ feet. The fall was accompanied by a noise described as a continuous roll of thunder accompanied by a crackling sound

Through the efforts of Professor E. J. Thompson of our Faculty the smaller mass has been obtained for the university cabinet. It is irregularly square in form, about 15x18 inches and of an average thickness of 6 inches.

A preliminary chemical examination shows the metallic portion to consist of an alloy of iron, nickel, and tin. Full half the mass consists of stony matter, which appears in dark green crystalline masses embedded in a light gray matrix. When the whole is powdered, a violent reaction ensues on the addition of hydrochloric acid, which is increased on boiling. The boiling acid appeared to dissolve all but the gray matrix, abundance of iron passing into solution. Some of the crystalline masses are two inches in thickness, and exhibit distinct monoclinic cleavage. Under the microscope in thin sections, olivine, and a triclinic feldspar appear to be embedded in a matrix of pyroxene. This work is in the hands of Professor C. W. Hall of the University, who intends to make a very thorough investigation of the optical properties of the minerals and matrix. The chemical examination was first attempted upon a very small quantity of material, but, now that we have an ample quantity, a complete analysis of the several minerals and the alloy will be made. A small piece of the metal polished and etched exhibited the Widmanstättian figures very finely.

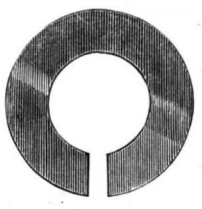


Fig. 4.—NUT LOCK.

The larger mass is still in the hands of those who dug it from the ground, although their ownership is contested by one who claims to have contracted for the land on which it fell. Their ideas regarding its value enlarge daily, the latest announcement being that they held it for $5,000.

IT seems now fairly established, says the *Chemical Review*, (on insufficient evidence, we are inclined to think), that *Botrytis infestans*, the parasite which occasions the potato disease, is the same which gives rise to diphtheria.

A Chinese Tile Factory.

A correspondent of the *Builder*, in a recent account of his visit to one of the mining districts of China, thus describes the Imperial Tile Manufactory at Lien-li-ku, about fifteen miles west of Pekin: In this factory all the yellow tiles and bricks required for imperial buildings are made, as also large numbers of green, blue, and other colored tiles for various ornamental purposes. The material used is a hard blue shale, nearly as hard as slate, ground to powder by granite rollers, thirty or forty feet in diameter. The powder is then stored in heaps and taken to the works as required. For ordinary work the powder is mixed with a proper proportion of water and moulded into large bricks, which are laid out to dry for some hours, after which they are dealt with by the modelers. When bricks are to have a moulding on them, say for coping a wall, the plan of operation is as follows: Two pieces of wood, each cut to the shape of the moulding, are placed upright on a slab. The clay brick is placed between them, and two men run the mouldings roughly along with chisels. They then apply straight edges to test the accuracy of their work, and finally rub the edges with moulds somewhat in the same way as plasterers make mouldings at home. The brick is then passed to a third man, who cuts any necessary holes in it, and to the fourth, who trims it off and repairs any defect. The ornamental tiles and bricks, representing fabulous animals, etc., are first roughly moulded, and afterwards finished off with tools exactly similar to those used for modeling in clay in Europe. Some of this work has some pretensions to artistic merit. All the bricks and tiles are baked in ovens, and then, after having the glaze put on, are baked a second time. All the work done at this manufactory appears to be first rate, and the number of people employed when they are busy is about 500.

Breadth of the United States.

Few people are aware that the proud boast of Englishmen that the sun never sets on the British Empire is equally applicable to the United States. Instead of being the western limit of the Union, San Francisco is only about midway between the furthest Aleutian Isle, acquired by our purchase of Alaska, and Eastport, Me. Our territory extends through 197° of longitude, or 17° more than half way round the globe. The *Rocky Mountain Presbyterian*, in commenting on this fact, says: "When the sun is giving its good-night kiss to our westernmost isle, on the confines of Behring's Sea, it is already flooding the fields and forests of Maine with its morning light, and in the eastern part of that State is more than an hour high. At the very moment when the Aleutian fisherman, warned by the approaching shades of night, is pulling his canoe toward the shore, the wood-chopper of Maine is beginning to make the forest echo with the stirring music of his ax."

The Brooklyn Navy Yard.

The chief naval depot of the United States is widely known as the Brooklyn Navy Yard; but few have any adequate idea of its importance or the many objects of interest to be seen there. It is one of the most delightful as well as instructive spots in the vicinity of New York. Its huge workshops, its great dry dock, built at a cost of over $2,000,000, and the enormous amount of machinery and material attract attention; while the ships lying at the wharves repairing, or anchored off the yard in commission, and the enormous guns on the ordnance wharf, give one an idea of the means by which Fort Fisher, New Orleans, and Mobile were taken. The museum in the building in which the commandant's office is situated contains curiosities from every part of the world where our vessels have cruised and our flag has floated, with historical relics of the Navy, and of itself is well worth a visit.

A Deaf-Mute Cow.

A Russian veterinary surgeon reports that a cow, twelve years old, of Algava breed, belonging to a Russian nobleman, never showed signs of hearing, nor bellowed. Seeing the other cattle bellow, she tried to imitate them by stretching her neck and head, and opening her mouth, but she could not produce any sound. The sense of vision of this cow was found to be unusually well developed.

FIREPROOF paper may be made, according to the *Pharmaceutische Zeitung*, from a pulp consisting one part of vegetable fiber, two parts of asbestos, 1-10 part of borax, 1-5 part of alum. The ink is made from 85 parts of graphite, 0·8 part of copal varnish, 7·5 parts of copperas, 30 parts of tincture of nutgalls, and a sufficient quantity of indigo carmine.

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THE NARICA.

The narica, or quasje, sometimes called the brown coaiti, found in Southern America, is represented in the accompanying engraving. It is a very lively and amusing animal, and possessed of singular powers of nose and limb. Distrustful by nature it will very seldom venture to approach a strange object until it has endeavored to ascertain the nature of the unknown by means of its sense of smell, which is marvelously acute. It seems to be as inquisitive as it is distrustful, and will not be satisfied until it has, by gradual degrees, approached and examined anything which it does not quite understand.

One of these animals, which was kept in confinement for some time, was extremely tame to those who understood the peculiarity of its temper, but was irresistibly morose and sulky with those who would not respect its customs. Any stranger who ventured to approach the animal was repelled with open mouth and threatening cries, unless he propitiated the creature by offering it some delicacy of which it was fond. It would then lay aside its suspicious demeanor and become suddenly confidential, returning the caresses of its newly found friend, and searching eagerly for a further supply of food. It proved to be quite a useful inhabitant of the house when it was domesticated, for it was accustomed to roam over the premises in chase of mice and rats, which it pursued unrelentingly through house, hay loft, and stables. It was also accustomed to pay visits into the garden, where it spent much of its time in catching snails and slugs, and in digging after worms—a task for which its powerful claws are eminently calculated to adapt it. When it was supplied with meat, it was accustomed to tear its food to pieces with its claws before carrying it to the mouth; and in the act of feeding, it always supplied itself by hitching one of its claws in the morsel which it was about to carry to its mouth. It struck up a friendship with a little dog, and would permit its four-footed friend to occupy the same bed, but would never endure the society of any other animal.

The color of this creature is extremely variable, as it seldom or never happens that two specimens are marked in precisely the same manner. In some individuals the dark portion of the fur is brown, mottled with black; but the general hue of the fur is a brown, tinted more or less with chestnut, and occasionally being so pale as to be of a warm fawn color. The under surface of the body and the internal face of the limbs are of a gray hue, tinged with yellow or orange, according to the individual, and extending, in some cases, to the sides of the neck and the lower jaw. The coat of the narica is rather thick, and the texture of the fur is harsh; it does not lie closely to the body, but presents a rather shaggy and rough aspect.

NARICA, OR QUASJE.—*Nasua Narica.*

Uses of the Hop-Plant.

In the *Wiener Landwirthschaftliche Zeitung*, Dr. Emil Pott calls attention to the many useful purposes for which various parts of the hop plant may be applied, over and above the mere production of the umbels employed in brewing, to which alone the growers' care appears to be given at the present time. To begin with, the tendrils furnish a good vegetable wax, and a juice from which a reddish-brown coloring matter can be extracted; further, their ashes are greatly valued in the manufacture of certain Bohemian glass wares. Of still greater importance is the fact that a pulp for paper-making can be prepared from them, and though the goods thus manufactured cannot be satisfactorily bleached, very serviceable unbleached papers and cardboards are got from this raw material. The fibers can also be used in the manufacture of textile fabrics. Experiments in this direction extend to a far-back date, and in Sweden yarn and linen making from hop fibers has long been an established branch of industry, which is constantly increasing in importance and extent. The separation of the fibers has hitherto presented considerable difficulties, but these appear to be effectually overcome by the process recently devised by Dr. Weiss of Neutomischel, of steeping them for 24 hours in cold water containing 5 per cent of sulphuric acid, or for 20 minutes in boiling water to which 3 per cent of the acid has been added. Other mineral acids, such, for instance, as muriatic, may be similarly employed. Nordlinger, of Stuttgart, also has patented a plan of rendering the fibers very flexible and tractable. This he effects by boiling them in closed vessels with soap and soda, and after thorough washing, treating them with diluted acetic acid, and then again washing in cold water. Another use to which hop twigs may be put is that of basket and wicker work. Lastly, it must not be forgotten that the young shoots form a very palatable vegetable, not inferior to asparagus in delicacy of flavor, while the leaves, and the spent hops themselves, supply an excellent food for live stock generally, and especially for sheep. Dr. Pott contends that by due recognition of some or all of these numerous virtues of the plant, growers can always repay the cost of cultivation without reference to the hop itself, which of course will remain the chief object in view, and can render themselves more independent of the great fluctuations in the price of the latter to which they are at present subjected.

Fossil Footprints in Anthracite.

At the last meeting of the Academy of Natural Sciences, Dr. Joseph Leidy read a letter from Mr. W. Lorenz, Chief Engineer of the Philadelphia and Reading Railroad Company, referring to a fossil specimen presented to the Academy by Mr. William D. H. Mason, of Williamstown, Pa. The specimen is a mass of coal shale with footprints, and was discovered by the donor at the Ellangowan colliery, in the Mahanoy coal field. Mr. Lorenz remarks that it is of special interest as having been the first specimen of the kind found in the anthracite coal field. The specimen is an irregular slab, upwards of a foot long, and less than half the breadth. The upper surface is obscurely ripple marked longitudinally, and is crossed in a slant by seven tracks, which are in pairs, except one, in advance on the right. The four tracks on the right occupy a line of six inches, and are about an inch and a half apart from those on the left. The more perfect impressions exhibit four widely-divergent toes, successively increasing in length from within outwardly, excepting that the fourth toe is slightly shorter than the third. The expanse on the tracks is about one inch. The impressions probably pertain to some salamandroid animal; and as it had been found useful to refer to fossil foot tracks as the representatives of the animal by which they were made under distinct names, he would, in accordance with a suggestion from Mr. Lorenz, name the form represented the Ellangowan anthracis.

Parrot Speech.

The interesting sketch of the "History of My Parrot," which Dr. Wilks contributes to the current number of the *Journal of Mental Science*, deserves a passing notice. The comparative study of the facts of intercommunication among men and among animals necessitates the admission that animals possess language; and the mechanism and apparatus for articulate speech, in those animals which possess it, do not differ from those of man. A bird learns to speak by imitation, through the organs of hearing, and in a manner very similar to that in which children learn words and sentences, and the bird speaks on special occasions in consequence of some association or suggestion, "the usual provocative for set speeches at all periods of human life." A new expression, after having been repeatedly uttered before the parrot, is practiced by it spontaneously, indefatigably working at the sentence by itself. At first it is only able to get out the first word or two, then more and more, until it has the power of uttering the whole. In just the same way a child will learn a French sentence. A sentence is soon lost by the parrot if not frequently uttered, and the last words are lost first; the first words—those most readily acquired—are lost last. Speech of the bird, on any given occasion, is due to suggestion—the presence of the person or object with which the words were first associated. Of this Dr. Wilks gives several striking instances; as, "half-past two" whenever the coachman comes for orders, "go to sleep" when approached after dark, "give me a bit" when dinner appears, and "cheese" when the cheese is put upon the table, a sound like water being poured out whenever a jug of water is brought in. Thus the bird associates words or sounds with objects, and, where the right names have been taught it, may be said to know their names; more, the bird invents names, making a particular sound, which had never been taught, whenever nuts were brought upon the table. The sight of a cat makes the parrot say "mew," as the sight of a train makes a child say "puff, puff."

Dr. Wilks concludes by remarking that the differences between animals and children are much slighter than are the explanations, which, on the assumption of instinct in the one case and reason in the other, we put upon them, and suggests that the chief difference between man and animals is to be found in smallness of knowledge of the fine arts possessed by the latter.—*Lancet.*

A Baby Sea Lion.

A sea lion, sent by rail from San Francisco to Central Park, New York city, in the latter part of June, gave birth to a cub on the way. By the 4th of July the little fellow had attained a length of about two feet, and weighed fifteen pounds. The mother did not seem very affectionate, and was rather disinclined to suckle her offspring, at least in the day time. The superintendent said, however, that the nursing probably took place during the night. As the swimming powers of the little fellow were not fully developed, it was proposed to draw the water out of the tank, so that the baby could suck his rather unnatural mother. When the latter is approached she shows anger and makes for the intruder, barking and showing her ugly fangs. Last year, in the Brighton (England) aquarium a sea lion was born, and one also in the Cincinnati Zoological Garden. In the latter case the mother died soon after the birth of her cub, and the little sea lion died also.

THE height of impudence, the *Chemical Review* thinks, is the man who seeks to abrogate patents calling himself a patent law reformer!

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Intellect in Brutes.

During my residence in Cornwall, says a correspondent of *Nature*, I had a most intelligent and faithful dog for fifteen years. I had him when a month old. His mother was a beautiful liver-colored spaniel, rather large; his father a black Newfoundland; my dog took after him in color and shape.

In 1843 a young and self-taught artist asked me to allow him to paint my likeness in oil colors, and I consented. His studio was in the next town, three miles distant, and as often as required I went over; I, however, did not take my dog with me. It was done in Kit-Cat size; and he succeeded so well in the likeness and artistic work, that when exhibited at the annual meeting of the Polytechnic Society at Falmouth, a medal was awarded to it, and, as well, it was "highly commended." Not only this, it brought him into notice and gained him lots of employment. The artist was so grateful for my attention that he presented me with the painting, and I still have it. When it was brought to my house, my old dog was present with the family at the "unveiling;" nothing was said to him nor invitation given him to notice it. We saw that his gaze was steadily fixed on it, and he soon became excited, and whined, and tried to lick and scratch it, and was so much taken up with it that we—although so well knowing his intelligence—were all quite surprised; in fact, could scarcely believe that he should know it was my likeness. We, however, had sufficient proof after it was hung up in our parlor; the room was rather low, and under the picture stood a chair; the door was left open without any thought about the dog; he, however, soon found it out, when a low whining and scratching was heard by the family, and on search being made, he was in the chair trying to get at the picture. After this I put it up higher, so as to prevent it being injured by him. This did not prevent him from paying attention to it, for whenever I was away from home, whether for a short or long time—sometimes for several days—he spent most of his time gazing on it, and as it appeared to give him comfort the door was always left open for him. When I was long away he made a low whining, as if to draw attention to it. This lasted for years, in fact as long as he lived, and was able to see it. I have never kept a dog since he died, I dare not—his loss so much affected me. I might tell of many of his wonderful actions; he could do most of such things as are related of other dogs. I am now only anxious to notice this recognition of my likeness, from never having heard of another such fact being recorded of any other dog.

Another correspondent says: During the recent severe winter a friend was in the habit of throwing crumbs for birds outside his bedroom window. The family have a fine black cat, which, seeing that the crumbs brought birds, would occasionally hide herself behind some shrubs, and when the birds came for their breakfast, would pounce out upon them with varying success. The crumbs had been laid out as usual, one afternoon, but left untouched, and during the night a slight fall of snow occurred. On looking out next morning my friend observed puss busily engaged scratching away the snow. Curious to learn what she sought, he waited, and saw her take the crumbs up from the cleared space and lay them one after another on the snow. After doing this she retired behind the shrubs to wait further developments. This was repeated on two other occasions, until finally they were obliged to give up putting out crumbs, as Puss showed herself such a fatal enemy to the birds.

Immunity of Rodents to Solanaceous Poisons.

According to the *Lancet*, Prof. Haeckel, of Marseilles, has investigated the action of the alkaloids of solanaceous plants upon the rodents, with a view of ascertaining the conditions which determine the remarkable immunity to the poisonous effects of such alkaloids presented by these animals. The fact of the immunity has long been known in the case of the rabbit and guinea-pig, especially with regard to belladonna, and Prof. Haeckel has shown that it is also possessed by several species of rats, and exists not only for belladonna, but also for the alkaloids of black and white hellebore, and of stramonium. The results which he has obtained show that the rabbit and guinea-pig may be fed for a long time with the leaves, and even with the roots, of the poisonous solanaceæ without detriment, and that the rat bears very well the addition of these plants to its ordinary food. The immunity of the rabbit and guinea-pig is so great that Prof. Haeckel was able to bring up several generations on this food, giving them, during the summer, the leaves exclusively, and during the winter mixing dried powdered leaves and roots with equal parts of other food. He adopts the views of Bouchardat, enunciated long ago by Chatin with respect to arsenic, that the effect of the poisons lessens in proportion as animals recede in organization from man. He believes, from further experiments, that the alkaloids of these poisons are destroyed as fast as they enter the blood. M. Colin, in the discussion on the report, was inclined to attribute the immunity of the rodents rather to the small solubility of the vegetable alkaloids, which need, for absorption, transformation into a soluble compound by the action of the gastric juice. In these animals the food rests a very short time in the stomach, and passes with great rapidity into the intestine, and the alkaloids pass away by the bowel almost unchanged. M. Chatin, however, doubted this explanation, on the ground that the alkaloids of the vegetables, although in themselves insoluble, are commonly so combined in the plant that they will dissolve readily. He believed that the immunity of the rodents to these poisons depends on their peculiar organization, and suggested, as an important subject for investigation, the precise point in the animal series at which the immunity exists.

Traveling Rocks.

Lord Dunraven, in an interesting article in the *Nineteenth Century* about Canada, and his experiences in moose hunting, relates the following:

A strange scene, which came within my observation last year, says his Lordship, completely puzzled me at the time, and has done so ever since. I was in Nova Scotia in the fall, when one day my Indian told me that in a lake close by all the rocks were moving out of the water—a circumstance which I thought not a little strange. However, I went to look at the unheard-of spectacle, and, sure enough, there were the rocks apparently all moving out of the water on to dry land. The lake is of considerable extent, but shallow and full of great masses of rock Many of these masses appear to have traveled right out of the lake, and are now high and dry some fifteen yards above the margin of the water. They have plowed deep and regularly defined channels for themselves. You may see them of all sizes, from blocks of, say, roughly speaking, six or eight feet in diameter, down to stones which a man could lift. Moreover, you find them in various stages of progress, some a hundred yards or more from shore and apparently just beginning to move; others, half-way to their destination, and others again, as I have said, high and dry above the water. In all cases there is a distinct groove or furrow, which the rock has clearly plowed for itself. I noticed one particularly good specimen, an enormous block which lay some yards above high-water mark. The earth and stones were heaped up in front of it to a height of three or four feet. There was a deep furrow, the exact breadth of the block, leading down directly from it into the lake, and extending till it was hidden from my sight by the depth of the water. Loose stones and pebbles were piled up on each side of this groove in a regular, clearly defined line. I thought at first that from some cause or other the smaller stones, pebbles, and sand had been dragged down from above, and consequently had piled themselves up in front of all the large rocks too heavy to be removed, and had left a vacant space or furrow behind the rocks. But if that had been the case the drift of moving material would of course have joined together again in the space of a few yards behind the fixed rocks. On the contrary, these grooves or furrows remained the same width throughout their entire length, and, have, I think, undoubtedly been caused by the rock forcing its way up through the loose shingle and stones which compose the bed of the lake. What power has set these rocks in motion it is difficult to decide. The action of ice is the only thing that might explain it; but how ice could exert itself in that special manner, and why, if ice is the cause of it, it does not manifest that tendency in every portion of the world, I do not pretend to comprehend.

My attention having been once directed to this, I noticed it in various other lakes. Unfortunately my Indian only mentioned it to me a day or two before I left the woods. I had not time, therefore, to make any investigation into the subject. Possibly some of my readers may be able to account for this, to me, extraordinary phenomenon.

[Any one familiar with ice action in our northern lakes and rivers, will have no great difficulty in accounting for the rock movement described. It takes place in various ways, depending on the depth of water, the breadth of the pond or river, the force of the wind and waves, variations in water level, and other conditions. Just which of these causes, alone or combined, operated in Lord Dunraven's Nova Scotia lake it is impossible to say from the description he gives. Probably the last named, and the wedging of the ice-masses against the larger rocks, when rising and falling with the water, had most to do in moving the bowlders on shore. —ED.]

Machine-made Hammered Horsenails.

According to the *Ironmonger*, another of our labor-saving machines is about to be adopted in England. The Stirchley Company will now, the writer says, become the sole manufacturers in England of the Sheridan horsenails. These are the product of a recent American device of indubitable merit. They are hammered hot from head to point by a succession of blows similar to those made by hand. To manufacture the nail in America a joint-stock company was recently started at Cleveland, Ohio, with a capital of $50,000, and having Mr. Henry B. Sheridan, C. E., the inventor of the machine, for its managing director, or president. The machines are capable of turning out an average of 500 lb. a day, and any pattern which may be required can be shaped. Two forging machines have been brought over from Cleveland, and under Mr. Sheridan's personal supervision they have been erected at the Stirchley Works, where I have just seen one of them in operation. It was served by an American nailer, who, taking his Swedish iron rods hot from a small portable furnace and thrusting them two at a time into the machine, which weighs about 1½ tons, and runs at 1,000 revolutions a minute, quickly shows them dropping out in the blank, properly bent, and shaped in a style surpassing any hand-made horsenail I ever saw. From the forging machine the blanks are taken, when cold, to the finishing machine, which draws the blank out, compresses it, and points the nail ready to drive. This machine weighs about 18 cwt., and finishes, with two boys to feed it, 500 lb. a day.

MISCELLANEOUS INVENTIONS.

Messrs. Charles Holzner and John Winstandley, of Louisville, Ky., have patented an improvement in coal-hods, which consists in forming the lower edge of the body portion of the hod with an outwardly-flared flange, and fastening the hoop, foot, or base-ring thereto by contracting it upon said flange and riveting the ends of the hoop together in such contracted position upon the flange. It also consists in combining with the flanged body portion and base-ring a wooden bottom having a metal lining and a tapering or beveled edge, which bottom is forced inside the base-ring up into the lower edge of the hod, and clamps the flange at the bottom of the body portion between its beveled edge and the base-ring to make a compact and secure connection. We call attention to an advertisement in another column relating to the invention.

An adjustable "scoop-board," adapted for attachment to the tail of the wagon, for use in husking or hauling corn, and for other purposes, has been patented by Messrs. Thos. F. McGuire and John Ditto, of Oxford, Ia. It consists in the combination, with the hinged scoop-board, of a semi-circle-brace, having apertures for a clamping pin or screw, that passes through a keeper.

Mr. Samuel T. Harrison, of San José, Cal., has patented an improvement in magazine fire-arms, which consists of a carrier having an intermittent vertical movement controlled by a lever connected with a finger on the guard, which receives the cartridge from the magazine, carries it to the breech of the piece, and when it is ejected into the breech, returns and locks the breech-block in place behind it. Also, a breech-block, in which is sheathed the needle, connected by a link with the finger of the guard, from which it receives an intermittent reciprocatory movement, serving to drive the cartridge from the carrier into the breech.

A paper bag, provided with a tie-cord secured within a fold on that edge of the blank which forms one of the seam-laps, has been patented by Mr. Charles Newman, of Alton, Ill.

Mr. Edwin D. Finch, of Stanton, Mich., has devised an improved mechanical telephone, in which the vibrations of a diaphragm are transmitted by a cord or wire to a receiving-diaphragm at a distance; and the invention consists in novel features, whereby the vibrations are concentrated upon the line, and false vibrations prevented; also, in means for adjusting the tension of the line and diaphragms, and relieving the diaphragms of tension when not in use.

Mr. Robert MacKellar, of Peekskill, N. Y., has invented an improvement in fire-grates for burning soft and hard coal. It is so constructed that the coal can be easily stirred and kept loose and free from ashes, so as to burn freely. It consists in the combination of the screw with a grate having a slot formed through its center, the screw forming the middle portion of the grate.

A hanger, having arms or yokes formed of spiral springs, united by a central piece of wire formed into a loop, by which it is hung from a hook, has been patented by Mr. Frederick H. Zahn, of Springfield, Ill.

An improvement in apparatus for disintegrating grain and distilling spirits, patented by Mr. Edward Fox, of Brooklyn, N. Y., consists in combining, with the mash-tub and still, a steam-pipe, injector, mash-pipe, and pan, and in combining with the still a dome having a pipe leading to condenser, perforated trays, and gutters.

A lock adapted for securing both the upper and lower sash of the same window has been patented by Mr. George F. Knight, of Carroll, O. It consists in the combination of a detachable key having a nib, and a pivoted spring-actuated angular lever, having a lug to engage with a window-sash, and the apertured case inclosing the lever, so that when the key is turned in a certain position its nib will catch over the edge of the free end of the lever, and traction on the key will then tilt the lever, but when turned into another position will release the lever.

An improvement in that class of coffee-pots which are provided with an inner receptacle or strainer, has been patented by Mr. Thomas Keys, of Jacksonville, Ill. It consists in providing the inner receptacle or strainer of a coffee-pot with an inwardly-projecting flange or lip near its top.

Mr. David Smith, of Boston, Mass., has patented an improvement in urine-guards for water-closet seats. The guard is preferably made of glass or glazed earthenware, or other material which will not absorb moisture.

The Manufacture of Damascus Steel.

In a series of articles on mining and metallurgy at the Paris Exhibition is promulgated the following interesting data on the method of making Damascus steel sword blades at Zlatoust, in the Ural: The pig iron used in making the latter is a spiegel, with 8 per cent of manganese, which is partly converted into puddled steel and partly refined. The cast-steel ingots of about five pounds weight are made from selected qualities of puddled steel, 61 per cent of the crucible charge being hard, 23 per cent medium steel, 10·37 per cent refined pig iron, and 3·71 pure magnetic ore. The tilted bars are twice piled for shear steel, a layer of sulphide of antimony being placed between the different bars. The final pile is made of four square bars, about one-eighth of an inch in the side.

THE way to convert modern pottery into the antique is to boil the former in oil and bury it in wood ashes. One will be astonished to find how quickly the new article will become in appearance a veritable antique.

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After Graduating—What?

The season of college commencements has just closed, and hundreds of young graduates, with their sheepskins in hand, are pondering, undecided, what profession to pursue.

Whither are all these talented and accomplished young gentlemen going? inquires the *Christian at Work*. What will they do? Where and how strike for success?

Although the professions of law, medicine, civil engineering—and, some may cynically add, the ministry also—are overcrowded already, and are driving multitudes at the point of starvation out of their ranks, yet the vast majority of these inexperienced and ambitious sheepskin carriers are persuaded that "there is always room at the top," and that each for himself is exactly the individual fitted by his Maker—and his Alma Mater, of course—to climb there, and with immense applause. Now it is well for society and mankind that there are so many ardent natures who thus challenge a trial in coveting the best gifts and highest places. Their aim is not to be ridiculed or despised. It is in the main noble and generous. Very rarely does the deliberate acquisition of mere "filthy lucre," or of the means of low and selfish gratification, consciously and avowedly enter into it. One says: "As a physician my object shall be unequaled skill in baffling disease and saving life;" another: "As a lawyer, I will work for the largest knowledge of legal principles and the attainment of commanding ability in settling differences between contentious dispositions;" and so each in turn is largely influenced, let it be granted, by the purest motives which can be marshaled at the threshold of his future calling, and which beckon him with winning voices to enter therein.

Against such allurements it may seem as ungracious as it will possibly prove vain to put two stern and needful inquiries.

First, admitting that the hero of commencement honors is not expected to be an angel acting with absolute unselfishness and unworldliness in the choice of his life-sphere, and admitting, therefore, that he has a certain right to calculate the chances of the success and the advancement of which, veil it as we will, *self* is the center and mainspring; it is nevertheless proper that he be required to make his calculation of chances with a cool head, with a rigid and unflinching investigation of his defective traits. The trick of translating a Latin ode, or of demonstrating that the three angles of a triangle are equal to two right angles, or of showing that Leibnitz is the author of the theory of unconscious mental activities in metaphysics—all this is not an immaculate sign of fitness to argue a case before the Supreme Court, or to diagnose the ills to which humanity is heir. Let the young graduate be cautious, be wise, be deliberate in his decision, remembering that it carries with it the gravest issues of time, and that it binds him to hardest toil and manifold self-denials.

Secondly, we must not fail to remind the new-born graduate that conscience should be appealed to as the highest arbiter in this sovereign self-election to a life-work. As a rational and accountable being every man is under obligation to his moral powers and to his God to ask: Where can I be the most useful? How can I accomplish the most good? Possibly he may conclude—and we suspect that just here lies room for the exercise of good sense and wisdom—that to be useful and happy it is not necessary to be a professional man at all. The farm makes its cry—and it is a loud and emphatic cry, too—for educated and noble-minded occupants. The bane of American society to-day is the silly, nay, the wicked idea that whoever has been through the schools must sport a title to his name, or descend to the disgraceful position of a nobody. This idea is heresy against manhood, and will prove the utter curse of its proud victim.

What Ismail Pasha did for Egypt.

In a long and intelligent letter suggested by the downfall of the late Khedive of Egypt, Charles Dudley Warner pointedly sums up the great works of improvement begun and largely carried out by the bankrupt monarch. After trying to show that the unfortunate Khedive only paid the penalty of all men who get ahead of their time and have not power enough to quite break with it or to compel circumstances to their will, Mr. Warner says:

Ismail Pasha has done more or attempted more for the good of Egypt than any ruler since the great Pharaohs. He has done more to put it in the line of modern progress than any ruler since the Conquest. The achievements of the man are something amazing, as all readers on Egyptian affairs know. The Suez Canal is his work in a very large sense. The modernization of parts of Cairo and Alexandria is due to him. The building of railways, telegraph lines, and numerous canals is his work. The creation of a trained army, and of schools and bureaus of technical education in connection with it, is his work, aided by foreign military talent (much of it American) which he has called in—an army the common soldiers of which were taught to read and write, and the brightest minds of which had an opportunity for superior education. He has put steamers on the river, on the Mediterranean, and on the Red Sea. He has developed a large trade with Central Africa. He has been not only friendly but zealous in the support of schools, of science, of investigations and explorations for the benefit of Egypt. His organized expeditions into the south have been more for exploration and for scientific purposes than for conquest; and he has loyally co-operated with England in the suppression of the slave trade. He has made expensive and almost desperate attempts to interest the Egyptians in improved agriculture and in manufactures. It is in these great public attempts that he has become bankrupt—his private extravagances (not to be apologized for) never would have reduced him to this condition.

The Action of Sewer Gas on Lead and Zinc.

We take the following, says our excellent contemporary, the *Plumber and Sanitary Engineer*, from the report by Mr. T. Kinnear, sanitary inspector of Dundee, Scotland, for 1878:

It is impossible to determine otherwise than by experience and observation how long an ordinary lead soil pipe or trap will resist the action of sewer gas before perforation takes place, but it is certain that a thick one will do so much longer than a thin one, and it is equally true that one efficiently ventilated will serve nearly double the time of one continuously air-bound. I have paid particular attention to the action of sewer gas on zinc rhones on eaves of buildings where it was striking on the under part, and found in the course of a couple of years or so pretty large holes eaten completely through, showing that that material could not long withstand the effect of the gas. Lead is, of course, more durable than zinc, but the difference is only a question of degree, as shown by the fact that, in not a few of the water closets repaired by the officers of the department during the year, small apertures were found in the main vertical lead pipe, and in the cross or horizontal one leading from it to the trap of the closet various perforations were found on the top, indicating clearly the operation of foul air from the drain. Lead traps and soil pipes from water closets, baths, and fixed basins, are all subject to tear and wear, but the traps, being burdened with the additional strain of barring the passage of sewer gas, do their work less efficiently and for a much shorter period than they are generally credited with, hence the necessity for proper ventilation and occasional inspection. There is often considerable indifference shown by many plumbers when sent by their masters to examine into complaints of smell supposed to be coming from lavatory appliances. They usually look for a fluid leakage; and when that is not perceptible they leave, declaring to the complainer that the pipes are all right, when probably a little longer time spent in making a more complete examination would have revealed that such was not the case. They seem to imagine that it is the liquid only which wears holes, and do not even dream that the gas from the drain is the most powerful agent of the two as an element of mischief. This is another fruitful means by which sorrow is brought to many a home. It is indisputable that drain air accelerates decay in lead fittings, and these and their drain connections ought to be periodically examined. To facilitate this they should be placed in a position of easy access, with their covering left to open freely, and not hidden in an out-of-the-way corner as they usually are.

A Story of Pluck and Industry.

We have heard a good deal about hard times of late years, and more, perhaps, about the "insurmountable difficulties" attending the career of a young man, particularly a working man, who has neither influence nor capital to back him. A very pretty commentary on that sort of cant is furnished by the experience of two German boys who landed at Castle Garden, strangers and without money, about a dozen years ago. The story—more or less closely paralleled in the experience of thousands—is worth telling, both as an encouragement to the young and as an index of the chances which American life offers to the plucky and persevering. It comes out in connection with a recent festival celebrating the tenth anniversary of the founding of a novel industry, and the completion of some extensive factory buildings in the little village of Brockett's Bridge, N. Y. The story, as told by a *World* correspondent, runs in this wise:

Thirteen years ago—or, to be precise, on the 11th day of July, 1866—Alfred and Bruno Dolge, boys of seventeen and nineteen, landed at Castle Garden as emigrants from the city of Leipsic. Their worldly means were less than one dollar. But they immediately sought and found work, one at his trade as piano maker at $4 a week, the other as an engraver. For three years Alfred Dolge, the younger of the two, worked steadily with Messrs. Steinway as a journeyman, and then he determined to go into business on his own account as a dealer in piano materials. He had little capital and was not twenty-one years old. But he had pluck and industry. Understanding the business, he concluded to manufacture piano feltings instead of importing, and he opened a small workshop in Brooklyn, associating his elder brother with him. Success followed, and he has seen his feltings take the first prize at the World's Fairs in Vienna, Paris, and Philadelphia. The feltings are made chiefly from Silesian wool, though certain brands of Australian and Cape Town are used, and such is the demand for them that the agents in New York have ceased to solicit orders. Of course this has not been easy of accomplishment, for, even in this country, there was a feeling that nothing but European goods were fit for use; but now the best pianomakers of London, Paris, and Leipsic (in which the three other felt manufactories are located) send to Brockett's Bridge for their supplies.

When the Exposition was held at Vienna Mr. Dolge arrived there in July only to find that, through the incapacity of the United States officials, his boxes were still unpacked. The jury in piano materials had already made their award, but Mr. Dolge, undaunted, challenged their attention, brought his goods before them, and by practical experiments demonstrated their superiority. Finally the gold medal was unanimously awarded him, though there was not an American on the jury. Triumphs at Paris and Philadelphia followed as a matter of course.

Up to 1875 piano-makers manufactured their own sounding boards. But at that time Mr. Dolge began their construction, and now supplies all the leading piano-makers of the United States, and exports these sounding boards to England, Germany, Italy, Norway, etc. A thousand were shipped to London, July 5, and the foreign agents have received directions to take no more orders until March, 1880. A large portion of the new building will be devoted to this branch, the spruce logs being sawed into planks in the basement and thence carried through every process until ready for shipment. In conjunction with this the manufacture of piano mouldings will be carried on, the facilities for carving being greater than in any other factory in the United States.

Perhaps the thought which most often occurred to the visitors recently was that all this had been accomplished during the four years of severest depression that the country has ever known. It was in 1875 that Mr. Dolge made his purchase of the old tannery at Brockett's Bridge, with its immense water privilege (600 horse power), and determined to launch his little bark on larger waters. His best friends tried to persuade him from the venture, but as he expressed it, he "had faith in the country and its future." Now the buildings have a frontage of 440 feet, with a height of three and four stories. Mr. Dolge has $220,000 invested in the property and gives employment to 150 laborers, nearly all of whom are American, and all of whom are of the highest type of intelligent working people. The success of these new industries has transformed a once deserted village into a prosperous hamlet, and though the village is eight miles distant from the railway station at Little Falls, it is attracting many visitors. The Brockett's Bridge people point to their work with pride as a living proof that even in the hardest times pluck and brains can force their way to fortune.

Formerly the makers of English pianos shipped the spruce lumber from this country to make their own sounding boards, each dealer constructing his own. When it was first proposed to send them the completed sounding boards the Englishmen laughed at the idea, and when Mr. Bruno Dolge arrived in London, three years ago, he found his agents overwhelmed by this ridicule and so discouraged that they had not taken a single order. It looked dark, so bitter was the prejudice against this Yankee idea. "Why, it's all nonsense," said one leading London manufacturer; "you might as well send us our pianos from America all ready made, you know." But Mr. Dolge stuck to his man, got him to see the boards and test them, and finally took his order for 500 sounding boards, and then every prominent dealer in London followed suit. American ingenuity had saved them time, trouble, and expense, and the success that has crowned these industries will follow others if our capitalists will only make the venture. At least this was the moral of the celebration and speeches.

Lemon Verbena.

The well-known fragrant, sweet-scented, or lemon verbena (*Lippia citriodora*) is regarded among the Spanish people as a fine stomachic and cordial. It is either used in the form of a cold decoction, sweetened, or five or six leaves are put into a tea-cup, and hot tea poured upon them. The author of a recent work, "Among the Spanish People," says that the flavor of the tea thus prepared "is simply delicious, and no one who has drunk his Pekoe with it will ever again drink it without a sprig of lemon verbena." And he further makes a statement, more important than all the rest, if true, that is, that if this decoction be used one need "never suffer from flatulence, never be made nervous or old-maidish, never have cholera, diarrhea, or loss of appetite."

ONE MILLION BUSHELS OF WHEAT.—The transactions in wheat at Chicago, on Saturday, July 19th, the newspapers of that city state, exceeded one million bushels.

Rocky Mountain Railways.

In a letter from Colorado a correspondent of the New York *Tribune* says that there is no more striking evidence of the prosperity and enterprise of Colorado than the rapidity with which narrow gauge railroads are built into the Rocky Mountains. "The Denver, South Park and Pacific road zigzags up the South Platte cañon and over the pass into the South Park on grades that no engineer could have dared to suggest ten years ago. Scarcely less daring has been the engineering of the Denver and Rio Grande road over the La Veta Pass of the Sangre de Christo range into the valley of the Rio Grande River. More wonderful than either in its conception and execution has been the construction of the Arkansas Valley Railroad from this place through the Royal Gorge, a cañon almost as grand in its proportions and more inaccessible than that of the Colorado. I have not passed through the gorge, and shall not undertake the impossible task of describing it at second-hand, but I did observe with great interest the progress of the work above the gorge. The grading is nearly completed to Grainett, more than a hundred miles from Cañon City, and the bridging and track laying can be pushed forward with almost any desired rapidity, unless the quarrel between the Denver and Rio Grande and the Atchison, Topeka and Santa Fé companies causes delay. Much of the grading above the gorge has been difficult and expensive, and the grades are very heavy, but the work seems to have been well done.

"I met in this city, to-day, an engineer of the Santa Fé

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road who told me that if his company retained control of the Arkansas Valley line, and the Gunnison country should develop into a rich mining region, a line across the great range would probably be built next season. I expressed surprise and doubt that it would be possible to cross that range with a railroad track. He assured me that it was not only possible, but very probable. It used to be supposed, he said, that the only way in which it was possible to build a railroad over a great elevation was to distribute the grade over as much space as possible. This made the road bed very expensive. Railroad engineers in Colorado, he said, now work on a different theory. They follow the natural contour of the ground as nearly as possible, and "bunch" the heavy grades together as much as possible. It is much cheaper, he continued, to use locomotives heavy enough to take the trains over the steep places than to spend so much money in bringing the road to an average grade over a considerable portion of its line. With the completion of the railroads now in progress of construction much of the wildest and grandest scenery in Colorado will be easily reached, and the Rocky Mountains will yearly become more popular as a summer resort."

Jelly and Jam.

Raspberry jam is an essential element in the construction of Washington pie, and as this pie is a Boston institution which is not frequently met with outside of a circle whose circumference is fifteen miles distant from the Massachusetts State House, it is not surprising that the greater portion of the raspberry jam consumed in the United States is made here.

The manufacture of the article has been increasing of late, and there are now some eight firms engaged to a greater or less extent in its production, and making an aggregate of nearly 500 tons per annum. As their product sells for 18 cents per pound, its total value is therefore $180,000. The dried raspberries of which the jam is made costs 85 cents a pound, and are bought by the jam manufacturers either of farmers and country storekeepers, or of Boston commission merchants.

The manufacture of jelly is a less prominent industry here, though several parties make more or less of that article for bakers' use. Few Boston concerns have had the temerity to attempt to compete with Baltimore manufacturers of cheap "jellies," such as are being wholesaled all over the country at the present time at 70 cents a dozen, or less than 6 cents each. As the glasses which contain those jellies can hardly cost less than 2 cents apiece, and as the labels, covers, etc., are not made for nothing, the price received for the "jelly" itself is evidently not much above 3 cents per glass. Although the demand for this "jelly" has become large, of late, it is pretty well understood that it is principally an animal instead of a vegetable product, being composed mostly of gelatine, variously colored and flavored.

A story was current once that the consumption of cattle hides in the manufacture of jelly in London was so great as to cause a sharp advance in the hide market. Such an effect could hardly be produced at the present time, however, since merchantable hides can be made to yield a good deal more money in the form of leather than in jelly.

The jelly that is manufactured in Boston is nearly all made of apples, and sells at about 14 cents per lb. Apple now forms the base of an endless number of jellies, such as currant, raspberry, peach, pineapple, etc., which are made by simply adding extracts to flavor the apple jelly; and so perfect is the imposition that the great majority of consumers are deceived by it, or, in other words, cannot tell it from the jelly made from the fruit with which this is only flavored. It comes much cheaper than the real article. Real current jelly, for instance, costs somewhere about 28 cents per lb. The latter is made to some extent, and is sold by grocers who cater to the highest class of family and hotel trade.—*New England Grocer.*

Activity not Energy.

The *Christian Union* thus defines the difference between activity and energy, and suggests wherein a large class of industrious people lack that element which produces success.

There are some men whose failure to succeed in life is a problem to others as well as to themselves. They are industrious, prudent, and economical; yet, after a long life of striving, old age finds them still poor. They complain of ill luck. They say that fate is always against them. But the fact is that they miscarry, because they have mistaken mere activity for energy. Confounding two things essentially different, they have supposed that if they were always busy they would be certain to be advancing their fortunes. They have forgotten that misdirected labor is but waste of activity. The person who would succeed is like a marksman firing at a target: if his shots miss the mark they are a waste of powder. So in the great game of life, what a man does must be made to count, or might almost as well have been left undone. Everybody knows some one in his circle of friends who, though always active, has this want of energy. The distemper, if we may call it such, exhibits itself in various ways. In some cases the man has merely an executive capacity when he should have a directive one—in other language, he makes a capital clerk of himself when he ought to do the thinking of the business. In other cases, what is done is not done either at the right time or in the right way. Energy, correctly understood, is activity proportioned to the end.

American Competition with Sheffield.

The Mayor of Sheffield, England, recently presided over a meeting of business men, held in that city, to discuss the situation of their manufactures, and hear a paper read on Free Trade, by a Mr. Fletcher. At the conclusion of the discussion, Mr. Ward, the Mayor, said that one gentleman had remarked that in his opinion the competition between America and England would cease as regarded manufactures, because American goods were not so good in quality as the English. He was in a position to contradict a statement like that, because, having a connection with Australia, he found that American goods were being preferred in that market to those manufactured in Sheffield. When he went up to London he found that merchants who had hitherto sold large quantities of Sheffield goods, had indents for American ones, which were cheaper and better in quality. He could not for a moment conceive how the American manufacturers were to suffer in the race of competition. It was of the utmost importance that those in this country should put aside that feeling of lethargy that had come like a cloud over it, and bestir themselves once more. He could remember that in his younger days it was nothing unusual for him to work 14 or 15 hours a day, but nowadays, if they went to a merchant's office at ten o'clock in the morning, they found often that he had not "come down" to it, and if they went at four o'clock in the afternoon, he had "gone to his country seat." They were luxurious now, but the Americans were painstaking and persevering. They worked from early morn to late at night. Some time ago, when he was in America, he found the working-classes laboring in the grinding-wheels and shops at seven o'clock in the morning, and there they would remain until seven o'clock in the evening. He believed the Americans were working 15 or 20 hours a week more than they were in Sheffield. Then they saw restrictions put on by the English Government. By the Factory Acts, the manufacturer now must not allow his factory hands to work more than 53 hours a week. If they went to the continent they would find them there working 72 hours a week—according to law. Seeing that the machinery on the continent was working equally as rapidly as in England, it followed that in the 72 hours they got through a far greater proportion of work than could be done in the 53 hours. He concluded that such restrictions tended to retard progress in England.

Utilization of Waste Lands.

The utilization of waste lands in Great Britain is one of the questions of the day, and an example of what can be done in this direction by spirited private enterprise, and which is being rewarded by capital results, is the reclaiming of some 750 acres of land which once was Pagham Harbor on the Sussex coast. The first step taken was to make an embankment or sea wall, to get the soil drains into an open bed in the center of the harbor, the outlet at which is controlled by a sluice which is automatically closed at high water. Next came the process of cultivation. This was first attempted with horses, but the soil of a great part of the reclaimed land is close and muddy, and one of the essentials of its successful culture is to loosen and lighten the top soil so as to admit the air and rays of the sun. Plowing with horses did not satisfactorily effect this, because after plowing and harrowing a shower of rain caused it to run together again. It was then decided to apply steam power to the work, and the result has been remarkably successful, lifting up and thoroughly loosening the soil to a depth of 10 inches. The land thus treated keeps light, and does not run together again, and the condition of the corn sown on lands thus treated by steam power is remarkably superior to that on the same class of land worked by horse power. Of course, from the soft, muddy character of the soil, it would be impossible to travel engines over it, and, benefiting by the experience of a somewhat similar operation carried out at Barth, on the Welsh coast, a few years ago, the proprietor resolved to adopt the same system as that adopted at Barth, namely, that of Howard. The engine is placed on a road which has been made alongside the reclaimed lands, the ropes being passed round the piece to be cultivated, two traveling anchors taking the place of two men. During the past season a large number of acres were plowed and cultivated in this way, and, at the present moment, the corn sown there is fast ripening for the sickle.

The Writing Telegraph.

Cowper's writing telegraph has been placed on the London and Southwestern Railway, and has been working most successfully, says the *Engineer*, from Woking to Waterloo, a distance of 26½ miles, writing off the messages in ink, one after the other, in a perfectly legible manner, whether regular line messages or messages made up in order to give the instrument more work to do. On some days more resistance coils of wire have been introduced into the two line wires, in order to represent greater distances, and thus 62½ miles and 99½ miles have been worked through in a most satisfactory manner, it only being necessary in such cases to add a few more cells of the battery, which in no case was as powerful as is very often used on the same line. The effect of the currents through the multitude of other line wires, in close proximity to the two in use for the writing telegraph, was closely observed, and the effect of induction was so exceedingly small as only to produce occasionally a slight roughness in a straight line, when the pencil of the operator was quite stationary, but such effect was hardly ever perceptible in the writing itself, and never to affect its legibility.

We understand improved instruments are now being constructed, and will shortly be at work. The fact of this instrument requiring no clerk to receive the message, translate, and write it down, seems to be much appreciated, as a half-dozen such instruments may be telegraphing their yards of messages into one office without the least assistance from the clerk, who may from time to time cut off and send out the ready written messages; so that not only is the time of "calling" (as with ordinary instruments) saved, but the time of waiting till the clerk can attend at the other end of the line to receive the signals, which very often amounts to a much longer interval than is required for the whole message to be transmitted, especially in offices fitted with many instruments.

There is also a great advantage in having an absolute record of what has been sent by the writing telegraph at the transmitting station. Another very important feature is the facility with which all that it is necessary to learn to use the instrument may be found out in five minutes. Every operation is exceedingly simple, and there are practically no fine adjustments anywhere. Variation in the power of the battery is of no importance, as its effect may be overcome by simply pushing the levers, carrying the springs against which the needles pull a little further in or out, as may be necessary. The pen, which is a very small glass capillary siphon tube, is, though of glass, very strong—it may fall several feet on to a bare floor without breaking—and is very easily adjusted.

The writing telegraph presents facilities and advantages which, we believe, will make its adoption rapid and extensive.

RECENT MECHANICAL INVENTIONS.

Mr. John F. Secord, of North Greenwich, Conn., has devised an improved chain pump bucket, consisting of a rubber knob moulded solid upon an iron link.

Messrs. James M. Johnson and Charles E. Burns, of Lancaster, N. H., have invented an improved machine for making spool blanks. In this machine the blocks are cut out and bored simultaneously.

Mr. Thomas J. Torrans, of Mobile, Ala., has patented an improved device for making bale band ties, formed of the lower or stationary part, an upper or movable, a nicking chisel, made with a rounded edge, and a cutting chisel, made with a rounded edge and concaved sides. These parts are combined with a shear plate, and the whole is arranged so that a complete tie is delivered at each operation.

An improved brake for wagons and carriages, which is so constructed that the brake will be applied by the action of the horses in holding back, and with a force exactly proportioned to the forward pressure of the load, which will allow the brake to be locked in position when off, so that the wagon can be backed without applying the brake, has been patented by Messrs. Lycourgus L. Johnson and William E. Johnson, of Alanthus Grove, Mo.

Mr. Lorenzo D. Hurd, of Wellsville, N. Y., has patented an improved running gear for wagons, in which each wheel may rise in passing over an obstruction independent of the others, and without changing the level of the wagon body, and in such a way as to bring the wagon more perfectly under the control of the team.

A device for clipping horses and shearing sheep, to be operated by steam or compressed air, has been patented by Mr. Ernest W. Noyes, of Bay City, Mich. The several parts are arranged so that the speed of the clipping knife will be fully under the control of the hand holding the implement, and the exhaust steam or air will be carried away from the animal.

An improved millstone driver has been patented by Mr. William J. Blackwell, of Waynesborough, Va. It consists in forming the inner ends of both sections of the driver with an eye that encircles the spindle, and in connecting the lapped ends of such sections by lugs and recesses which cause the two sections to act in unison.

An improved apparatus for separating coal from slate, and for separating other substances of different specific gravities, has been patented by Mr. David Clark, of Hazleton, Pa. It consists in the combination of the perforated inclined chutes and adjustable slides with the perforated stationary bottom and the tank, and other devices which cannot be clearly described without an engraving.

An improvement in the class of door latches known as "thumb" or "drop" latches, has been patented by Mr. Joseph R. Payson, of Chicago, Ill. It consists in extending the inner end of the lever through an orifice in the latch piece, the lever having a fulcrum in the rose, with a preponderance of its weight upon the inner or latch side.

A simple, cheap, and efficient fastener for plow colters has been patented by Mr. P. A. Bagwell, of Oakland, Ky. This arrangement of brace and fastener reduces the leverage or strain, when working, upon the colter and beam at their point of contact, and it holds the colter so that it cannot become loose, as it ordinarily does when used in plowing heavy sods or among roots.

An improvement in needle bars for sewing machines of that class in which two needles are attached to and operated by the needle bar, so as to sew two seams at once, has been patented by Mr. Nathan Hayden, of Chicago, Ill. The invention consists in the combination of a slitted needle bar, two needles, and a single clamp and screw adapted to compress and retain both needles with equal security.

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Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

The best results are obtained by the Imp. Eureka Turbine Wheel and Barber's Pat. Pulverizing Mills. Send for descriptive pamphlets to Barber & Son, Allentown, Pa.

Steam Tug Machinery, Engines, Boilers, Sugar Machinery. Atlantic Steam Engine Works, Brooklyn, N.Y.

Fuller & Stillman, Chemical Engineers and Assayers, 40 Broadway, New York.

The New Economizer, the only Agricultural Engine with return flue boiler in use. See adv. of Porter Mfg. Co. page 78.

Holzner & Windstanley will sell two thirds interest of their right and title of the Coal Hod Improvement. Address Holzner & Windstanley. N. W. corner of Walnut and West Streets, Louisville. Ky

Philadelphia Hydraulic Works, Philadelphia. Pumps and Hydraulic Presses.

Wanted for Cash.—A useful novelty or toy that can be sold through the mail for 25 cents. F. R. Avery, Chicago

I wish to purchase a patent for some good article of manufacture. George Cosper, Winton Place, Ohio.

The Electric Light in its Practical Application. By P Higgs. Numerous Illustrations. $3.50. Mail free. E. & F N. Spon, 446 Broome St., N. Y.

Wanted—Second hand 2 or 3,000 lb. Steam Hammer. Address Forging Company, Hamilton, Ont.

For Sale—The legs and feet of a Mastodon. Mounted on Walnut Stands. C. W. Williamson, Wapakoneta, O.

The Asbestos Roofing is the only reliable substitute for tin, it costs only about one-half as much, is fully as durable, is fire-proof, and can be easily applied by any one. H. W Johns Manufacturing Company, 87 Maiden Lane, N. Y., are the sole manufacturers.

New 8½ foot Boring and Turning for sale cheap. A first class tool. Hilles & Jones, Wilmington, Del.

We want to make some heavy, patented machinery, on royalty or otherwise. Vulcan Works, Toledo, O.

Wright's Patent Steam Engine, with automatic cut-off. The best engine made. For prices, address William Wright, Manufacturer, Newburgh, N. Y.

For Solid Wrought Iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

H. Prentiss & Co., 14 Dey St., New York, Manufs. Taps, Dies, Screw Plates, Reamers, etc. Send for list.

For Screw Cutting Engine Lathes of 14, 15, 18, and 22 in. Swing. Address Star Tool Co., Providence, R. I.

The Horton Lathe Chucks; prices reduced 30 per cent. Address The E. Horton & Son Co., Windsor Locks, Conn.

Lincoln's Milling Machines; 17 and 20 in. Screw Lathes. Phœnix Iron Works, Hartford, Conn.

A Cupola works best with forced blast from a Baker Blower. Wilbraham Bros., 2,318 Frankford Ave., Phila.

Presses, Dies, and Tools for working Sheet Metal, etc. Fruit & other can tools. Bliss & Williams, B'klyn, N. Y.

Linen Hose.—Sizes: 1½ in., 20c.; 2 in., 25c; 2½ in., 29c. per foot, subject to large discount. For price lists of all sizes, also rubber lined linen hose, address Eureka Fire Hose Company, No. 13 Barclay St., New York.

Workshop Receipts for Manufacturers and Mechanics. Illustrated. $2 00 E. & F. N. Spon, 446 Broome St., N. Y.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N.J.

The Lathes, Planers, Drills, and other Tools, new and second-hand, of the Wood & Light Machine Company, Worcester, are being sold out very low by the George Place Machinery Agency, 121 Chambers St., New York.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon & Co., 470 Grand St., N. Y.

Bradley's cushioned helve hammers. See illus. ad. p. 29

Partner wanted. See adv. on page 30.

Excelsior Steel Tube Cleaner, Schuylkill Falls, Phila., Pa.

Machine Diamonds. J. Dickinson, 64 Nassau St., N. Y. Band Saws a specialty. F. H. Clement, Rochester, N.Y.

Sheet Metal Presses, Ferracute Co., Bridgeton, N. J.

Vertical Burr Mill. C. K. Bullock, Phila., Pa.

Eclipse Portable Engine. See illustrated adv., p. 62.

Yacht Engines. F. C. & A. E. Rowland, N. Haven, Ct.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Noise-Quieting Nozzles for Locomotives and Steamboats. 50 different varieties, adapted to every class of engine. T. Shaw, 915 Ridge Avenue, Philadelphia, Pa.

Stave, Barrel, Keg, and Hogshead Machinery a specialty, by E. & B. Holmes, Buffalo, N. Y.

Solid Emery Vulcanite Wheels—The Solid Original Emery Wheel—other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.

For Shafts, Pulleys, or Hangers, call and see stock kept at 79 Liberty St., N. Y. Wm. Sellers & Co.

Wm. Sellers & Co., Phila., have introduced a new Injector, worked by a single motion of a lever.

Steam and Gas Fitters' Tools a specialty. Send for circulars. D. Saunders' Sons, Yonkers, N. Y.

Ornamental Penman's Pocketbook of Alphabets. 32 plates. 20c. Mail free. E. & F. N. Spon, 446 Broome St., N. Y.

Elevators, Freight and Passenger, Shafting, Pulleys, and Hangers. L. S. Graves & Son, Rochester, N. Y.

Holly System of Water Supply and Fire Protection for Cities and Villages. See advertisement in SCIENTIFIC AMERICAN of this week.

Cutters shaped entirely by machinery for cutting teeth of gear wheels. Pratt & Whitney Co., Hartford, Conn

Deoxidized Bronze. Patent for machine and engine journals. Philadelphia Smelting Co., Phila., Pa.

Having enlarged our capacity to 96 crucibles 100 lb. each, we are prepared to make castings of 4 tons weight. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

NEW BOOKS AND PUBLICATIONS.

LABORYTORY TEACHING. By Charles Lou don Bloxam. Fourth edition. Illustrated. Philadelphia: Lindsay & Blakiston. 12mo., pp. 261.

In the ten years since this useful manual was first published its fitness as a guide to the beginner in practical chemistry has been amply demonstrated. The present edition differs from the last chiefly in giving the formulæ for the compounds to be studied. The book is well printed and has a good index.

FOUNDATIONS AND FOUNDATION WALLS. By George T. Powell. New York: Bicknell & Comstock.

A work for the house builder rather than the engineer, strictly practical, and obviously of much value to all having to do with foundation work.

ZEITSCHRIFT DES ARCHITECTEN UND INGENIEUR VEREINS ZU HANNOVER. Edited by W. Keck. Band 25, No. 1 and 2. Hannover: Schmorl & von Seefeld. 1879.

A technical journal, edited under the auspices of the Architects and Engineers' Society at Hanover, and of a very high standing in Germany. The first two numbers of 1879 contain, among other scientific and technical information, a paper on driving spiles by means of a jet of water; a statistical table showing the different observations on this subject; plans and descriptions of the Point Bridge at Pittsburg and of the proposed East River Bridge at Blackwell's Island; a carefully prepared description of the great railroad repair shops at Hanover, and a new theory for the computation of the strains in joint arch bridges.

RESULTATE AUS DER THEORIE DES BRUCKENBAUS. Von R. Krohn. Aachen: J. A. Mayer. 1879. (Results in the Theory of Bridge Building.)

In this work the author, Mr. R. Krohn, Civil Engineer and Professor at the Royal Rhenish Polytechnic School at Aachen (Aix la Chapelle) Germany, has collected and arranged the latest developments in the "Theory of Bridge Building," and has explained their application by numerous examples in an excellent manner. The work will be complete in two parts, the first of which has appeared and is now before us. It treats of iron truss bridges, their construction and calculation, the formulas, the derivation of the same, and the advantages of the several variations in the arrangement of the elements. The author has adopted the analytical and graphical method of calculation, and has based the computations of the strains on the experiments of Wohler and on the Daunhardt Weyrauch formulas. The distribution of the load and the strains arising therefrom are admirably demonstrated. The second part will treat of iron arched bridges and combination arched and truss bridges. The work is carefully illustrated and handsomely printed.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

(1) Olivia writes: We have a 10"x30" improved Allis Corliss engine, 95 revolutions per minute, and makes indicated h. p. as follows:

Log. π (3·14159)	0·497150	Area of piston in inches.
Log. 25	1·397940	
Log. steam pressure (60lb.)	1·778157	
Log. piston dist. 475 ft.	2·676694	
	6·349935	
Log. 33,000	4·518514	
Log. indicated h. p.	1·831421	∴ 67·83 h. p.
Less friction, etc.		17·83
Actual h. p.		50·

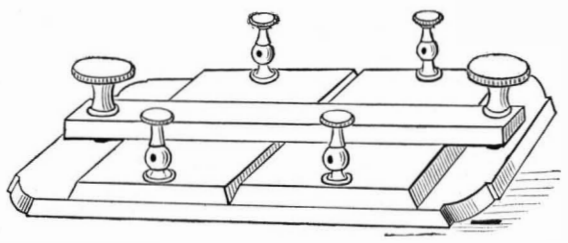
We are told that the engine will not develop over 30 h. p. by parties who claim to know. Have we figured correctly? If not, please correct us. A. Yes, if 60 lb. is the average pressure on the piston. But we suppose it is the pressure in the boiler. If so, there is your error.

(2) C. W. W. asks if there is any difference between a plumb and perpendicular line; if so, what. A. A plumb line is always a vertical line; a perpendicular line is one at right angles to some other line or surface, and may itself be vertical or horizontal, or at any angle with either.

(3) W D. M. asks: 1. How many square inches are there in a safety valve 2½ inches in diameter? A. 4·90 inches. 2. What pressure to the square inch would it require to raise a weight two feet from the center of valve and 2¾ inches from the center of the valve to the end attached to the outside of valve? A. See reply to F. J. R., p. 267, volume 40.

(4) J. L. C. asks: 1. Is it possible to become a good mechanical draughtsman without studying geometry? A. Possible, but a knowledge of geometry is very essential. 2. If so, what book or books would it be best to get on the subject, and where could I get them? A. "MacCord on Mechanical Drawing," for sale at this office. 3. Is it possible to get as good satisfaction in point of economy, out of a throttling slide valve engine, as you can from a cut off engine? A. No. 4. Which is best to do in cleaning out a boiler, to blow it out under pressure, or let the water run out after the pressure goes down? A. If there is time, let the boiler cool, the deposit will then be left comparatively soft.

(5) C A. P. asks (1) how to make an effectual lightning arrester to be used on a short line (400 feet) of telegraph. A. The engraving shows a common form of lightning arrester. It consists of two small brass plates mounted on a larger metallic plate and separated from it by a sheet of mica. The upper plates are put in the circuit, the lower plate is connected



with the ground wire. An overcharge of electricity passes through the mica and finds its way to the earth. 2. Do I infringe on any one's rights or break any law relating to patents when I make a pair of telephones like those (using horseshoe magnets) described in your SUPPLEMENT, No. 142—would I be doing so if I sold them? A. See Rights of Investigators, p. 128, volume 39, of SCIENTIFIC AMERICAN.

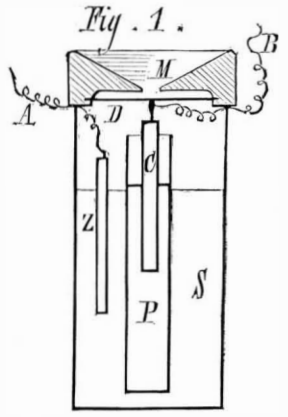
(6) C. E. B. says: I am using a small compressed air boiler, and I am troubled with a few leaks at the hub on the side: will two or three coatings of lead on the inside check it? If not, what will? A. Stop the leaks by calking if possible. If you do not succeed in this you may apply the white lead.

(7) W. H. R. writes: I have a cylinder, 6 inches diameter and 1 inch long, filled with water at 100 lb. pressure per square inch. 1. How many tons, acting on the 6 inch piston that works in the cylinder, would be required to compress the water 1-16 inch? A. That is equivalent to 1-96 its bulk; no liquid is susceptible of that amount of compression. 2. Is there any other liquid less compressible than water that will not affect either iron or brass? Is mercury less compressible? A. Mercury is less compressible than water, and does not affect iron. It will, however, affect brass.

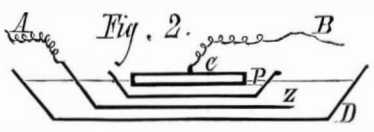
(8) A. B. J. asks how to use ultramarine blue for a wash blue, that will not spot in hard water. A. We know of no practical way of overcoming this, as the blue does not form a true solution. For this purpose Nicholson's blue (blue aniline) is preferable to ultramarine.

(9) W. J. asks: What is the horse power of an engine required to ascend a grade of 7 (seven) inches to the foot on a cogged rail for center of track, cog wheel to fit in same not to exceed 12 inches diameter, the weight to be taken up exclusive of the engines, and boiler's weight about 35 hundred weight? A. You do not give the speed at which you wish to run, but assuming 4 miles per hour, the power required would be, with engine, weight, say 20,000 lb. and other weight 3.800 lb., total 23,800 lb., 151 horse power, and to this add 25 per cent for friction and other losses. If weight or speed be increased, increase the power in proportion.

(10) H. W. F. writes: I have lately been making some interesting electrical experiments, and have arrived at very satisfactory results, some of which I would like to make known. Fig. 1 represents the



section of a telephone, which I think has one novel feature, the production of the electric waves at the source of the electricity. S is an ordinary battery jar, filled with salt and water, in which the zinc, Z, is suspended. P is a porous cup filled with ordinary battery solution of bichromate of potash. In this is suspended a piece of carbon, attached to a vibrating diaphragm, D. The wire, B, extends from the upper part of the carbon.



When a sound is made in the mouth piece, M, the diaphragm vibrates, the carbon is alternately immersed and drawn out of the fluid, the result is a series of electric impulses which act on an ordinary telephone receiver. In this way I have been able to transmit articulate speech with distinctness. Fig. 2 shows a section of a very powerful and cheap battery. D is the containing vessel, either a pie or soup plate. Z is a piece of amalgamated sheet zinc, with the wire, A, attached. P is a flower pot saucer which takes the place of the porous cup. C is a flat piece of gas carbon with the wire, B, fastened on the upper side, so as not to be eaten off by the acid. The plate, D, is filled with salt and water; P, with battery fluid. This makes a very good battery for three reasons; first, it is powerful; second, it is easily made; third, it is cheap.

(11) J. C. K. writes: I beg to differ from your answer to L. C. R. (36), in issue of 12th July. I remember that 45 years ago nails were made by hand and sold by count, and not by the pound—fourpenny at 4 pence per 100, sixpenny at 6 pence per 100, and so on through the different numbers; the term penny or number of pence was the retail price for 100. I notice the penny is pretty generally dropped now, and the simple numbers substituted, as 6's, 8's, 10's, etc., instead.

(12) H. J. P. asks how strong a battery is necessary to show the repulsion of bismuth from the poles of a magnet. I intend to try it with three cells of Leclanche, but do not think that will be enough. A. Use a magnet about 4 inches long, and 4 cells of Bunsen battery.

(13) A. Y. asks: 1. Is charcoal hammered No. 1 boiler plate always marked C. H. No. 1? A. For steamboat boilers, yes. 2. May plate not so marked be C. H. No. 1 iron to fill specification? A. No.

(14) H. J. C. asks for a detailed description of an "induction coil," suitable to be used with "Lyons transmitting telephone" which you described in SUPPLEMENT, No. 163. Please give diameter of central core, diameter and length of coil. No. and length or weight of both primary and secondary wires. The whole to be used on a circuit, two miles long, with ground connections. A. The core consists of a bundle of No. 18 iron wire 4½ inches long, ⅝ inch diameter. The spool upon which the primary and secondary wires are wound is as thin as it is possible to make it. Two layers of No. 18 silk covered copper wire are wound on the spool for the primary, and about eight layers of No. 36 silk covered wire are wound upon the primary, the several layers being separated by pieces of thin writing paper.

(15) W. A. M. asks how to prepare the so-called fish food used in fresh water aquaria, and what amount to use in an aquarium of about six gallons capacity, with from eight to twelve small fishes. A. We do not know to which preparation you refer. Seth Green says in relation to gold fish: "Feed them all they will eat and anything they will eat, worms, meat, fish wafer, or fish spawn, but take great care that you take all that they do not eat out of the aquarium."

(16) G. B. F. asks for the simplest and best process for estimating the amount of potassic iodide in a known quantity of co. fluid extract sarsaparilla. A. If the solution contains no chlorides, evaporate to dryness in a porcelain capsule, and heat cautiously to redness to destroy the carbonaceous matters. Moisten the residue thoroughly with silver nitrate dissolved in water, warm, throw on a tared filter, wash with water, dry in the dark, and weigh. One part of this is equivalent to 0·706 KI, nearly.

(17) W. M. asks: 1. Will a ten horse power boiler run a ten horse power engine, or is the boiler of greater power then the engine? A. Usually the boiler is more than equal to the power at which the engine is rated. 2. What is the reason that a person weighs as much before as after eating? A. Try the experiment of weighing yourself before and after eating. If you find you do not weigh more after eating we would be pleased to know what kind of food you eat. 3. In speaking of perpetual motion, do you not mean a machine that will act the same as an engine, that is, to drive other machinery? A. Any machine or apparatus that would keep in motion without any external aid would be called a perpetual motion.

(18) W. W. asks (1) how to make a small still on a cheap scale. A. You may use an ordinary iron retort capable of holding say 3 pints, and a small glass or block tin worm; place the worm in a tub or bucket, the lower end passing through a cork fitting a hole bored for its reception near the bottom of the vessel. Adjust the beak of the retort to the upper end of the worm. During the distillation conduct a stream of cold water to the bottom of the tub or bucket, and draw off the heated water near the top. See No. 110 of SCIENTIFIC AMERICAN SUPPLEMENT. 2. Please give a receipt for making a first class vinegar for family use. A. See p. 267, (19), volume 39, SCIENTIFIC AMERICAN.

(19) J. F. B. writes: 1. I have a 4x4 engine, and will 129 feet of ½ inch pipe give heating surface sufficient to run it; if not, how much more do I want? A. No, if your engine works up to 200 revolutions per minute, ½ inch pipe will be very likely to stop up; use the same length of ¾ inch pipe. 2. Is there any patent on a simple coil boiler? A. No.

(20) W. E. P. asks for the dates on which Mars came to opposition in the years 1858, '60, '62, '64, and '67. A. About as follows: 1858, May 15; 1860, July 22; 1862, September 29; 1864, November 23; 1867, January 30.

(21) F. P. K. asks: 1. Where can the fine red clay used in the manufacture of imitation lava ware be procured? A. Consult the report on "Clay and Clay Deposits of New Jersey," Professor George H. Cook, New Brunswick, N. J. 2. Is there any chemical that, by mixing with white clay, will in the burning turn it to a red color? A. Moisten it with strong aqueous solution of sulphate of iron, common copperas. 3. What can I mix with clay, to strengthen and toughen it? A. Try one or two per cent of fluorspar. The clay should be properly washed.

(22) G. A. F. asks: 1 How are scorification assays of gold and silver ores made? A. The powdered ore is mixed and covered with about ten times its weight of pure granulated lead in a small dish of refractory clay (scorifier) and introduced into the muffle of a cupellation furnace. If the ore is at all basic a few

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fragments of anhydrous borax (borax glass) are added to the contents of the scorifier. As soon as the lead has melted the door of the muffle is opened and the scorification proceeds until the ring of slag closes over the lead button. The scorifier is then removed and poured into a smoked iron mould. If, after breaking away the slag, the button is found to be small enough, it is immediately cupelled; if not it must be returned to the scorifier and reduced in size by scorification. The cupellation is the same as with the crucible beads. 2. I inclose clipping from an exchange which does not correspond with processes given in your paper from time to time for the manufacture of nitroglycerine: who is correct? A. The statement that nitroglycerine is a compound of glycerine and prussic acid, is incorrect.

(23) S. E. asks: For what is realgar used, and what is it worth? Is there a good market for it? A. It is used in the manufacture of certain pyrotechnic preparations, such as Bengal lights (niter 27, sulphur 7, realgar 2); also in the manufacture of orpiment and other arsenical compounds. It is quoted at 20 cents per lb.

(24) W. H. C. writes: 1. I have finished the two sections of the secondary coil of an induction coil, ¼ size of that given in SUPPLEMENT, No. 160. Connecting one Watson cell I find no result from the secondary wire, no spark or feeling when I touch the terminals with my tongue. The fine wire broke three times by accident; each time I soldered, using muriatic acid as a flux. I should think that, though I have no insulating medium between the two sections, I would have some results. A. Use battery enough to vibrate the interrupter strongly. Two cells of Grenet would answer. If you do not then get a spark you should examine the connections and test the insulation. Possibly your condenser may be at fault. 2. Ought not one Watson cell to be enough? A. One Watson cell is not enough. Use at least four.

(25) H. P. asks: What are the proportions given to the air chamber of a pump? A. From 4 to 8 times the capacity of the pump.

(26) A. D. writes: Referring to the phonograph described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 133, will you give more definite instructions regarding the construction of this little wooden spring, size, force, and kind of wood? A. The accompanying

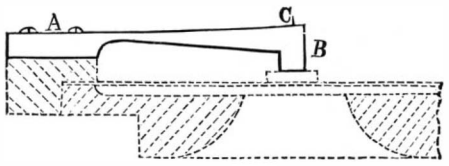

diagram gives the exact size and proportion, A being the portion attached to the mouth piece, B the portion that rests upon the diaphragm, and C the needle. The width should be about 3-16 inch and the end, B, should rest with some pressure on the small soft rubber block placed against the diaphragm. Any wood that springs well will answer. Holly is perhaps as good as anything.

(27) H. S. W. writes: 1. I contemplate building a small stern wheel steamer, dimensions: length, 50 feet, beam 9 feet, deck 12 feet, between decks 6 feet, height of cabin 7 feet, center 8 feet. She will be sharp forward instead of round, as our larger vessels are. Her boiler is 42 inches diameter, height 7 feet, engines 6 inches diameter, 24 inches in length. Are my proportions right? Is my boiler large enough for the boat? A. Your boiler is ample to drive the boat, and having about 180 feet surface should supply the engines. 2. Are my cylinders too large or small? A. Cylinders not too large; you might make them 6½ inches. 3. Would it be possible for such a boat to make the trip from New Orleans to the Suwanee River, in Florida? A. Yes with care and prudence.

(28) C. C. W. writes: I have a clinker built boat, 18 feet long, beam 4 feet 6 inches, draught at stern 18 inches; about 12 inches of this is extra keel. I have two high pressure engines, plain valves, set on the quarter; cylinders 2 inches by 4 inches working in ¼ expansion, carry 40 lb. steam, revolutions of engines 125. What would be the correct size of screw to run in shallow streams, and what would be a correct pitch of screw? A. 24 inches diameter and 2 feet 8 inches pitch. 2. I wish to know on what principle does the boiler injectors and inspirators work, or rather, how can an injector feed a boiler under 80 lb. steam, as they have to inject water into boiler against a pressure of 80 lb., and have only the same force to do the work? A. We cannot explain clearly the principle of the injector within the limits of "Notes and Queries." Consult some good book on engineering; that it does feed boilers with their own pressure there is no doubt.

(29) M. W. C. asks: 1. What knowledge of mechanics or machinery is requisite to the obtaining of an engineer's certificate to run a steam launch 20 or 25 feet long? A. Sufficient theoretical to understand the principle of operation of the steam engine and sufficient knowledge of the use of tools to be able properly to adjust the parts. 2. Is it necessary that a pilot license should be had to run such a launch? If so, what requisites are necessary to the obtaining of the same? Can one person take out both licenses? Are such licenses necessary for running a steam canoe such as was described in the AMERICAN a short time since? A. For reply to your other queries apply to the steam boat inspectors in your city.

(30) E. P. asks (1) for a cheap method of waterproofing cotton factory cloth suitable for a tent. A. See SCIENTIFIC AMERICAN, volume 39, p. 331 (9). 2. In the sentence "port the helm," does it mean to put the tiller to the port side? A. Tiller to port side.

(31) G. F. P. asks: 1. In the improved forms of dynamo-electric machines now made for producing the electric light, is the same current that supplies the carbons made use of to excite the fixed electro-magnets, or is it usual to have two series of armature coils? A. Usually, but not always. 2. Would a resistance of five ohms introduced in the working circuit of such a machine, by causing the current to traverse a considerable length of wire in the coils of the fixed electro-magnets before reaching the carbons, impair to any extent the brilliancy of the light with a machine capable of consuming rods ⅜ inch square? A. Of course the introduction of resistance into the circuit will impair the light, and the greater the resistance the more will the light suffer.

(32) F. & Co. ask: Can you give us any information of a way of bleaching resin? A gentleman informs us that proto-chloride of tin will do so. Is there anything injurious in introducing it into soap, it being first dissolved in water? A. Brown resin may be converted into yellow resin by simply boiling it with water for about 10 minutes. Its appearance may be somewhat improved by adding to the water about one per cent of stannous chloride. The trace of the latter adhering to the resin, after washing, will not prove injurious in soap.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

A. J.—Mr. M. von Lill, of Vienna, has lately analyzed some wolfram steel, generally known as Mushet's special steel, and has found it to contain: Iron, 87.120; manganese, 1·043; copper, a trace; wolfram or tungsten, 9·9888; carbon, 1·239; silica, 0·330; phosphorus, 0·039; sulphur, 0·008; total 99,767.—H. A. F.—The rock contains no precious metals, lead, or copper. It has no economic value.

COMMUNICATIONS RECEIVED.

On Small Propellers. By P. H. W.
On Alum Baking Powder. By E. B. F., Jr.
On the Microphone without a Battery. By A. C. R.

[OFFICIAL.]

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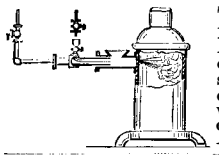

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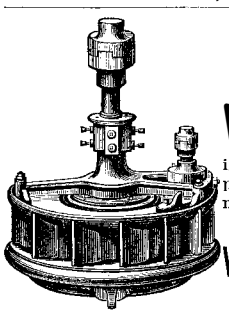

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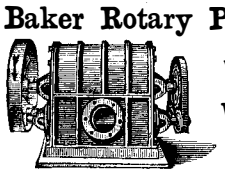

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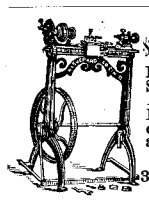

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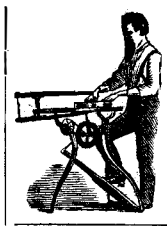

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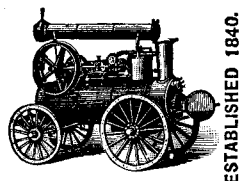

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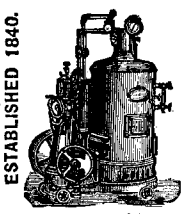

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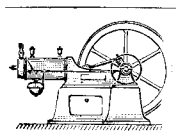

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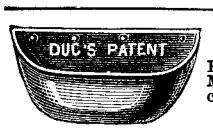

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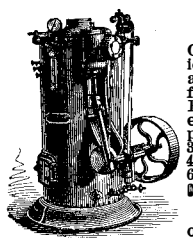

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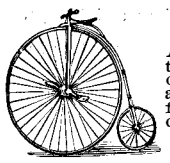

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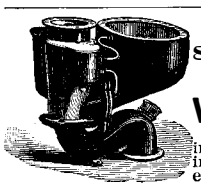

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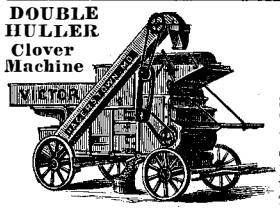

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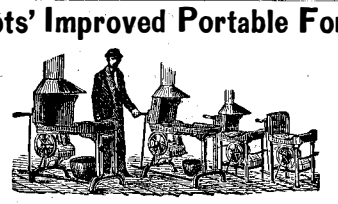

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